WUNTRONIC

PCIe Expansion System User's Manual

ExpressBox[4]

PCI Express® to PCI Express® Expansion

Model: EB4-1U-X8

EB4-1U-X8G2

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Preface

Advisories

Five types of advisories are used throughout this manual to provide helpful information, or to alert you to the potential for hardware damage or personal injury. They are **Note**, **Important**, **Caution**, **Warning**, and **Danger**. The following is an example of each type of advisory.

NOTE

Used to amplify or explain a comment related to procedural steps or text.

IMPORTANT

Used to indicate an important piece of information or special "tip" to help you

CAUTION

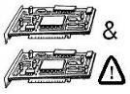
Used to indicate and prevent the following procedure or step from causing damage to the equipment.

WARNING

Used to indicate and prevent the following step from causing injury.

DANGER or STOP

Used to indicate and prevent the following step from causing serious injury or significant data loss.



COMPATIBILITY ISSUE

Used to indicate a known or potential compatibility issue between Magma and non-Magma hardware that may cause malfunction.

Disclaimer: We have attempted to identify most situations that may pose a danger, warning, or caution condition in this manual. However, Magma. does not claim to have covered all situations that might require the use of a Caution, Warning, or Danger indicator.

Safety Instructions

Always use caution when servicing any electrical component. Before handling the Magma PCI-Express Expansion chassis, read the following instructions and safety guidelines to prevent damage to the product and to ensure your own personal safety. Refer to the "Advisories" section for advisory conventions used in this manual, including the distinction between Danger, Warning, Caution, Important, and Note.

- Always use caution when handling/operating the computer. Only qualified, experienced, authorized electronics personnel should access the interior of the computer. The power supplies produce high voltages and energy hazards, which can cause bodily harm.
- Use extreme caution when installing or removing components. Refer to the installation instructions in this manual for precautions and procedures. If you have any questions, please contact Magma Technical Support.

WARNING

High voltages are present inside the expansion chassis when the unit's power cord is plugged into an electrical outlet. Disconnect the power cord from its source before removing the system cover.

Never modify or remove the radio frequency interference shielding from your workstation or expansion unit. To do so may cause your installation to produce emissions that could interfere with other electronic equipment in the area of your system.

When Working Inside a Computer

Before taking covers off a computer, perform the following steps:

1. Turn off the computer and any peripheral devices.
2. Disconnect the computer and peripherals from their power sources to prevent electric shock or system board damage.
3. Disconnect any telephone or telecommunications lines from the computer.

In addition, take note of these safety guidelines when appropriate:

- To help avoid possible damage to systems boards, wait five seconds after turning off the computer before removing a component, removing a system board, or disconnecting a peripheral device from the computer.
- When you disconnect a cable, pull on its connector or on its strain-relief loop, not on the cable itself. Some cables have a connector with locking tabs. If you are disconnecting this type of cable, press in on the locking tabs before disconnecting the cable. As you pull connectors apart, keep them evenly aligned to avoid bending any connector pins. Also, before connecting a cable, make sure both connectors are correctly oriented and aligned.

CAUTION

Do not attempt to service the system yourself except as explained in this manual. Follow installation instructions closely.

Protecting Against Electrostatic Discharge

Electrostatic Discharge (ESD) Warning

Electrostatic Discharge (ESD) is the enemy of semiconductor devices. You should always take precautions to eliminate any electrostatic charge from your body and clothing before touching any semiconductor device or card by using an electrostatic wrist strap and/or rubber mat.

Static electricity can harm system boards. Perform service at an ESD workstation and follow proper ESD procedures to reduce the risk of damage to components. Magma strongly encourages you to follow proper ESD procedures, which can include wrist straps and smocks, when servicing equipment.

You can also take the following steps to prevent damage from electrostatic discharge (ESD):

- When unpacking a static-sensitive component from its shipping carton, do not remove the component's anti-static packaging material until you are ready to install the component in a computer. Just before unwrapping the anti-static packaging, be sure you are at an ESD workstation or are grounded.
- When transporting a sensitive component, first place it in an anti-static container or packaging.

- Handle all sensitive components at an ESD workstation. If possible, use anti-static floor pads and workbench pads.
- Handle components and boards with care. Don't touch the components or contacts on a board. Hold a board by its edges or by its metal mounting bracket.

Rack-Mount Instructions

Elevated Operating Ambient - If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment compatible with the maximum ambient temperature (Tma) Specified by the manufacturer.

Reduced Air Flow - Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.

Mechanical Loading - Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.

Circuit Overloading - Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply writing. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

Reliable Earthing - Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).

Chapter 1 Introduction

General Specifications

The Magma 4 Slot PCI Express® to PCI Express® Expansion System is a general-purpose bus expansion chassis for the Peripheral Component Interconnect Express (PCIe) local bus. The expansion chassis is fully compliant with the PCI Express Local Bus Specification. This system consists of a PCI Express host card, a 1-meter iPass cable, the 4 Slot PCIe expansion chassis and a set of rack-mount brackets.

Item	Description
▪ Host Card:	Low Profile PCI Express x8 host card
▪ Backplane:	4 PCIe slots (expandable to 8 or more by chaining chases)
▪ Enclosure:	1U Rack-mount
▪ Dimensions:	19" W x 1.735" H x 28" D
▪ Weight:	27lbs or 12.25 kg
▪ Standard Cable Length:	1-meter iPass cable
▪ PCI Express Bus Specification	Revision 2
▪ PCI Local Bus Specification:	Revision 2.3
▪ PCI Bridge Architecture Spec:	Revision 1.2
▪ Interconnect Bandwidth:	8000 MB/sec or 8 GByte/sec
▪ Cooling:	Three 15.8 CFM fans One fan in each power supply module
▪ Power Supply:	250W, 90-264VAC/5 A, 47-63 HZ, 1+1 redundant, hot swappable power supply
▪ MTBF:	4,500,000 hours see table on next page
▪ Monitoring:	SNMP via Ethernet Audible Alarm
▪ Operating Environment:	0º to 70º C Operating Temperature -55º to 125º C Storage Temperature 0% to 90% Relative Humidity, Non-condensing
▪ Operating Systems:	Windows XP/2000/Server 2003/Vista Mac OS X version 10.4.x + Red Hat Linux 9
▪ Warranty:	1 Year Return to Factory
▪ Available Options:	3-meter or 7-meter iPass cable

MTBF Top Level Calculations

EB4-1U-x8G2 SYSTEM

Sub-assembly	Quantity	MTBF (unit) [Hours]	MTBF (all units) [Hours]
Power supply n+1	2	100000.0	10000000000.0
Fan(s) n+1	3	40000.0	1600000000.0
Host card	1	27000000.0	27000000.0
Vertical Backplane	2	50000000.0	25000000.0
Horizontal Backplane	1	10000000.0	10000000.0
SNMP Module	1	20000000.0	20000000.0
Total MTBF			**~ 4,500,000**

Pre-Installation Information

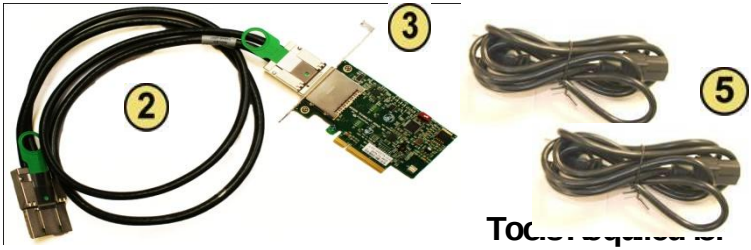
Before using the Magma expansion chassis you should perform the following steps:

- Inventory the shipping carton contents for all of the required parts
- Gather all of the necessary tools required for installation
- Read this manual

Parts List

The following parts are provided as part of your expansion system:

Item	Qty	Item
1	1	EB4-1U-X8 Magma expansion chassis
2	1	1-meter shielded iPass™ cable
3	1	Low profile PCI Express x8 host card
4	2	Rail installation ears
5	2	U.S. Standard 115V power cord
	1	Quick Start Guide



Installation

In order to complete the installation of the Magma expansion system you may need a Phillips-head screwdriver, depending on the installation type.

Chapter 2 Hardware Installation

The following steps will guide you through the installation of your Magma expansion system.

Electrostatic Discharge (ESD) Warning

All PCI cards are susceptible to electrostatic discharge. When moving PCI cards, it is best to carry the cards in anti-static packaging. If you need to set a PCIe card down, be sure to place it inside or on top of an anti-static surface. For more information, see "Protecting Against Electrostatic Discharge" in the Preface.

WARNING

High voltages are present inside the expansion chassis when the unit's power cord is plugged into an electrical outlet. Disconnect the power cord from its source before removing the enclosure cover. Turning the system power off at the power on/off switch does not remove power to components. High voltage is still present.

CAUTION

Before touching anything inside the enclosure, move to an ESD station and follow proper ESD procedures. Failure to do so may result in electrostatic discharge, damaging the computer or its components. For more information, see "Protecting Against Electrostatic Discharge" in the Preface.

STOP

If your Magma expansion chassis was not purchased directly from Magma, you must check to ensure that it doesn't contain any pre-installed PCIe cards.

Check the rear side of the chassis to see if any PCIe cards are visible in the slots. If you see a PCIe card, you should continue installation using instructions provided by your dealer. If no separate instructions are available, remove the cover by using instructions in Chapter 4 Install Cards and Drives. Then remove the card(s) as normal. If no PCIe card is visible, then continue with the cable installation.

Before you Begin

The system's ATX power supply is auto-switching. This means that it will automatically switch to match whatever source power you are using. Since all products ship with a US/Canadian Standard 125V power cord, you will need to use a locally available power cord for non-US Standard power sources.

1 Install PCI Express Host Card

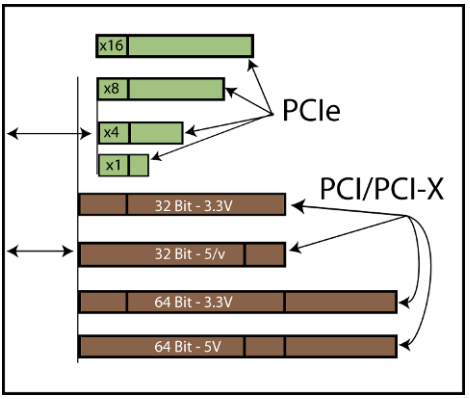
Begin the installation of your PCI Express (PCIe) host card by first powering down your computer. Use the procedures for shutting down your operating system and shutting off power to your system provided in your owner's manual or system documentation.

The PCIe host card is a "half-height," x8-capable PCIe card mounted to a "full-height" bracket as shown below:

For low profile case applications, you may need to change the mounting bracket to the low profile bracket that shipped with your system. This is done by removing the screws that hold the card to the bracket. Be sure you are using proper ESD procedures when completing this action.

Once the host computer is off and all power cords disconnected, remove the cover and insert the PCI Express host card into a vacant x8 (or x16) PCIe slot by gently pushing the card until it is firmly seated. Then secure the card to the slot with a mounting screw.

Notice that the PCI Express slots are located at a greater distance from the edge of the computer's mother-board than are the standard PCI slots as illustrated in the following figure.



STOP

YOU MUST ONLY INSTALL THE PCIe HOST CARD INTO A **PCI EXPRESS SLOT**.

Danger

Only use cards WITH brackets. This will ensure that your PCIe host card can only be inserted into a PCIe slot. Although PCI Express cards without brackets may fit into conventional PCI slots, you run the risk of damaging the PCI Express host card if you insert it into a PCI slot. Please ensure that your host computer has PCI Express slots and install the host card **only** into a PCI Express slot.

For more information on using PCIe cards, please refer to your computer's user manual or system documentation.

Next check the DIP switch settings on the Magma Host Card as shown:

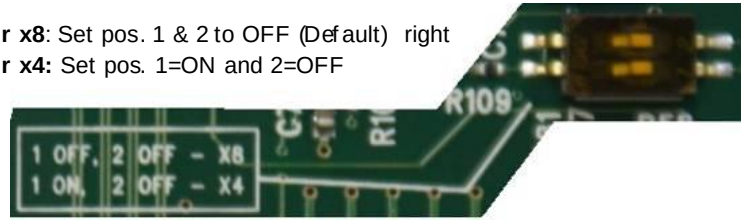
Host /Expansion Switch (Default→ Host):

As long as the card is used as Host, the switch should remain OFF. Move to the ON position **only** when the card is used as an Expansion Interface (EIF) in a Magma Chassis that supports this feature.

Bandwidth Switch (Default → x8):

This DIP switch sets the card's PCIe interface bandwidth to either x4 or x8 as can be seen in the photo.

For x8: Set pos. 1 & 2 to OFF (Default) right
For x4: Set pos. 1=ON and 2=OFF

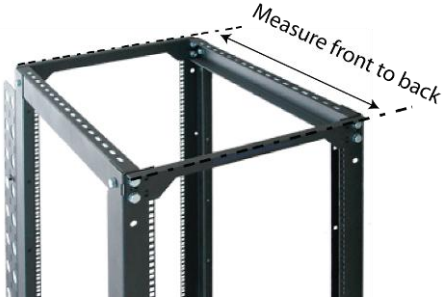


Since the EB4-1U-X8 supports x8 speeds, it is set in the x8 position by default. It should only be set to x4 if one is certain that the PCIe slot on the host PC supports only a x4 PCIe bandwidth.

2 Install Chassis in Rack

Locate a vacant 1U slot in your rack that is within the reach of the one-meter cable that came with your EB4-1U-X8 Expansion System. Install the rails in the rack as shown below:

Measure the rack from front to back so you can confirm how long the rail must be to fit properly.



Installation of Rack Ears (Original)

Install Rack Ears on both sides of the EB41U..

Use a 8/32 x 5/8 screws to mount the Rack Ears, as shown from the photo below. The screws are provided in the KIT

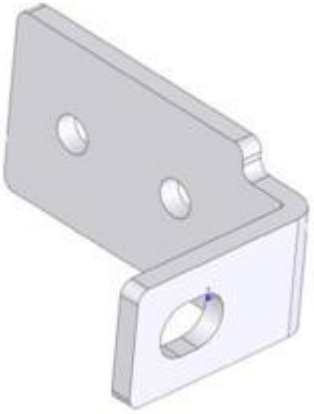
Align the Rack Ear on the side of chassis and secure it with the two screws, as shown from the picture

NOTE

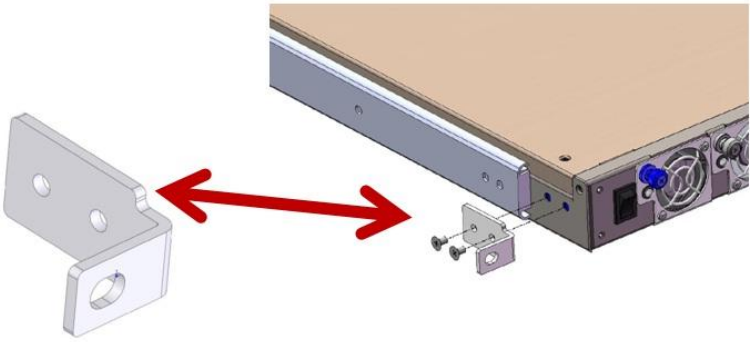
Notice that the holes on the Bar Nut are spaced unevenly to accommodate different racks.

Using new Rack Ears **((with single mounting hole)**

You can also use the new Rack Ear with single mounting hole, as shown form the photo below.



Use a 8/32 x 5/8 screws to mount the Rack Ears on both sides of EB4-1U, as shown from the photo below. The screws are provided in the KIT



Separate slide chassis members by lifting left hand disconnect lever up and pressing the right hand lever down. Keep the chassis members with the original outer (or cabinet) members.

Install the chassis member first using the first available mounting hole. The set back distance is the distance from the front of the chassis to the front of the slide. This set back distance will be the same when installing the front bracket to the cabinet slide member (figure 1).

Install the chassis member to the side of the chassis using screws or pins. If using screws, you may insert screws directly through the slide member or affix screws to the side of the chassis. If using pre-installed screws, place screw heads through the large portion of the keyhole slots in the slide member (figure 5). Tighten the screws.
If using pins, place the pins through the keyhole slots and push the slide member to the rear. The chassis member lock spring will snap over the first pin to secure without tools.

Mounting the cabinet members: The slide-to-cabinet mounting brackets have thre possible positions to allow alignment to EIA hole patterns. Note the fixed 3-hole spacing and the adjustable 2-hole locations. The 2-hole end of the bracket accepts both .50" [12.7 mm] and .63" [15.9 mm] pitch patterns. Choose the desired pitch pattern and loosely affix brackets to the slide.

The slides are installed with the brackets placed behind the cabinet rails. First determine the inside rail-to rail distance (figure 4). Extend the mounting brackets to fit this distance and loosely tighten the hex nuts that hold the brackets in place.

Insert the thumb screws through the cabinet rail and threaded holes of the brackets.

Extend slide cabinet member to its fully locked position. Bring ball retainer fully forward. Align chassis members with the black plastic lead-in pins. Install chassis by engaging the slide members and close completely. Check slide alignment by opening and closing the chassis. Any sign of binding indicates lateral stress or misalignment. Adjust slide position until movement is smooth. Tighten all screws and complete installation.

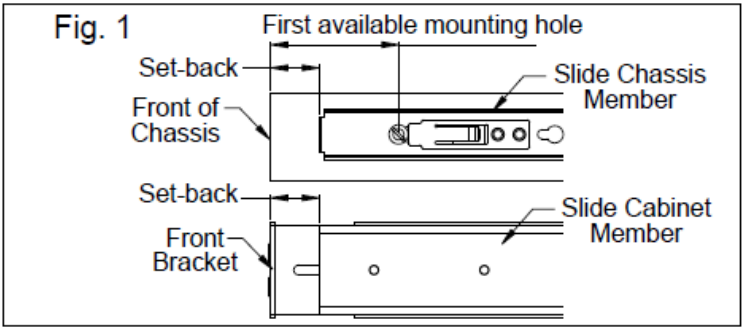


Fig. 1
First available mounting hole
Set-back
Front of Chassis
Slide Chassis Member
Set-back
Front Bracket
Slide Cabinet Member

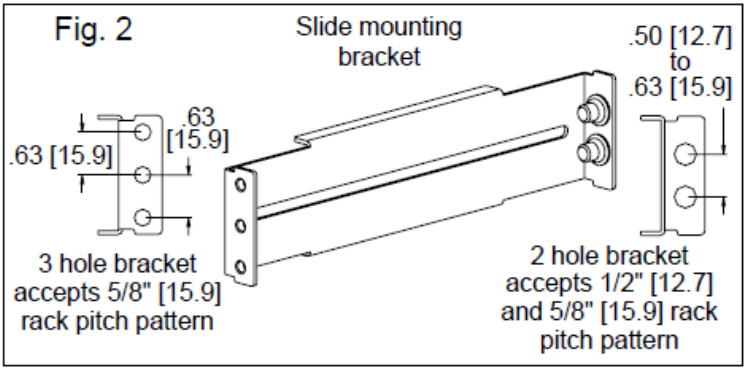


Fig. 2
Slide mounting bracket
.50 [12.7] to .63 [15.9]
.63 [15.9]
.63 [15.9]
3 hole bracket accepts 5/8" [15.9] rack pitch pattern
2 hole bracket accepts 1/2" [12.7] and 5/8" [15.9] rack pitch pattern

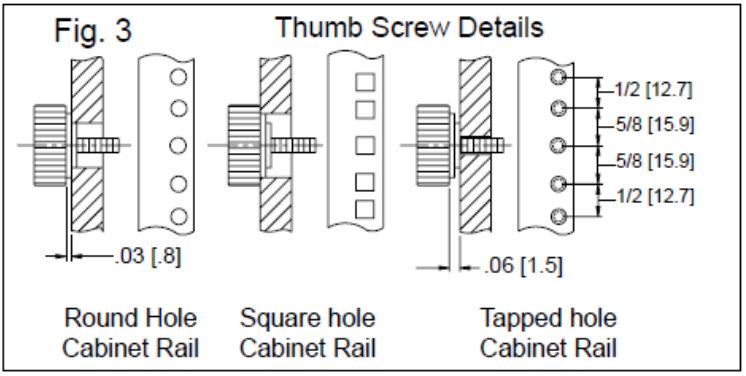


Fig. 3
Thumb Screw Details
1/2 [12.7]
5/8 [15.9]
5/8 [15.9]
1/2 [12.7]
.03 [.8]
.06 [1.5]
Round Hole Cabinet Rail
Square hole Cabinet Rail
Tapped hole Cabinet Rail

Fig. 4

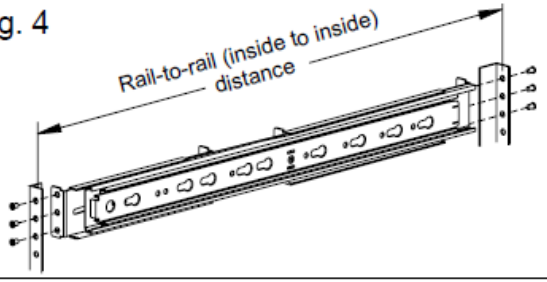
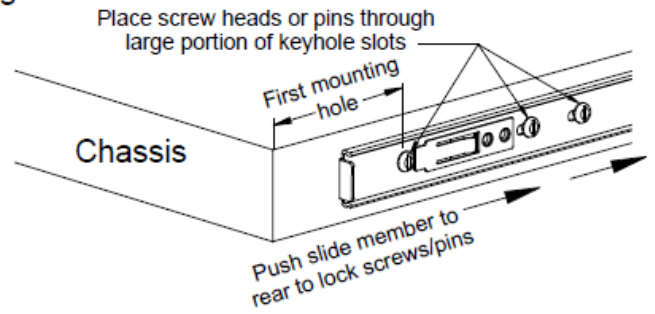


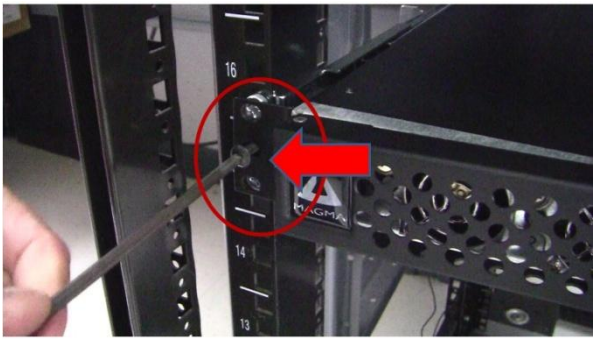
Fig. 5



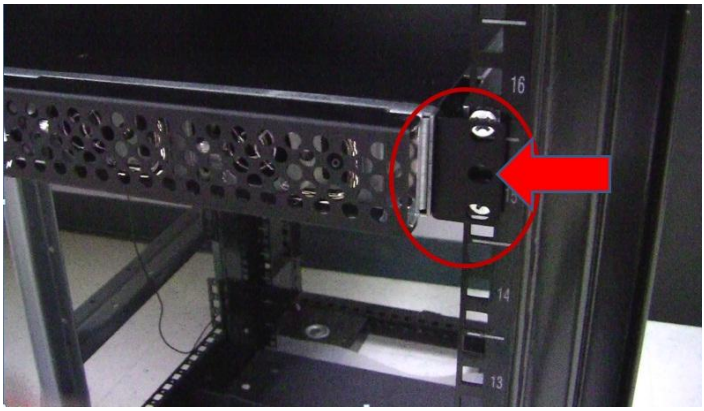
Next, assemble the Slide piece with the end bracket as shown and secure with 2 Panhead screws and locking nut. Ensure the Phillips screw head is located on the “open” side

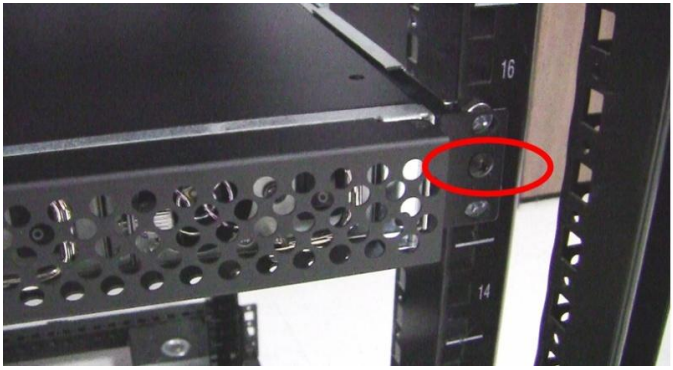
How to secure EB4-1U using Original Rack Ears

Install the Chassis into the Rack slide and secure it using Truss Head screws 8/32 X1


16
14
13

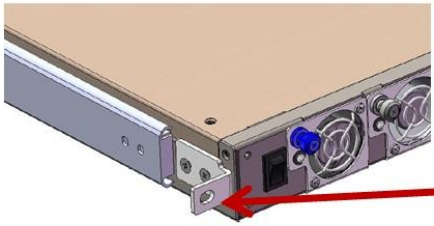
16
14
13





Using New Rack Ears to Secure EB14 unit.

Secure EB4-1U unit onto the Rack using the new Rack Ear with single-mounting hole. Use screw that came with the Rack.



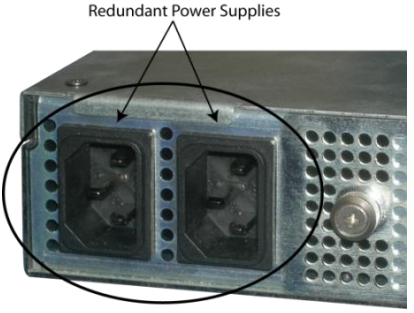
3 Attach Power and Expansion Cables

Carefully position the expansion chassis so that the supplied expansion cable will conveniently reach from the host computer to the connectors on the back of the chassis. Connect one end of the iPass cable to the expansion chassis' bottom iPass connector (labeled "IN" on top of the mobile tray). Then connect the other end of the iPass cable to the host card located in the host computer.

Connect one end of the cable to the bottom iPass connector

Connect the other end to the host card.

Connect the power cord to the power-in receptacle located at the rear of the enclosure.



CAUTION

All cables attached to the expansion chassis must be securely fastened. When you hear a "click," it is properly secured. If not securely connected, the connectors may cause intermittent or lost connections.

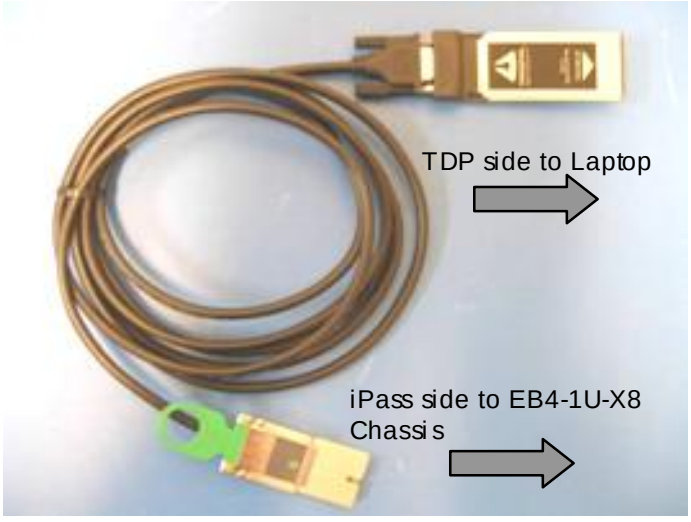
NOTE

If at all possible, plug all power cords from the expansion chassis and your host computer into a shared power strip, preferably one that has surge and noise suppression circuitry built into it.

Laptop Installation (Optional)

In addition to interfacing the EB4-1U-X8 expansion system to a PC, you can now add additional PCI Express slots to your laptop by installing Magma's ExpressCard host and connecting it to your chassis with a dedicated iPass-to-TDP cable featuring an iPass interface on one side and a TDP interface on the other.

Attach one end of the PCI Express cable to the Magma ExpressCard module and the other end to the connector on the back of the Magma chassis.



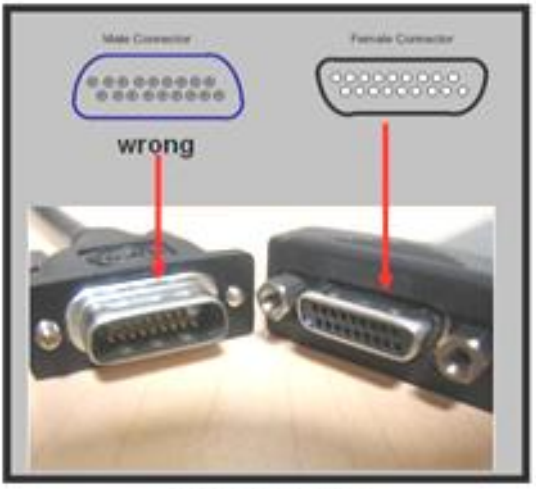
Tighten the thumbscrews connecting the ExpressCard to the cable on one end and verify the other end is properly latched into the iPass connector of the chassis.

In spite of the standardized design of the TDP interface, it is not impossible to connect the male and female connectors upside-down. In order to avoid that, please note the proper and improper concavity orientation of the connectors as shown in the two cases below:

Picture A shows the correct orientation:

PICTURE A

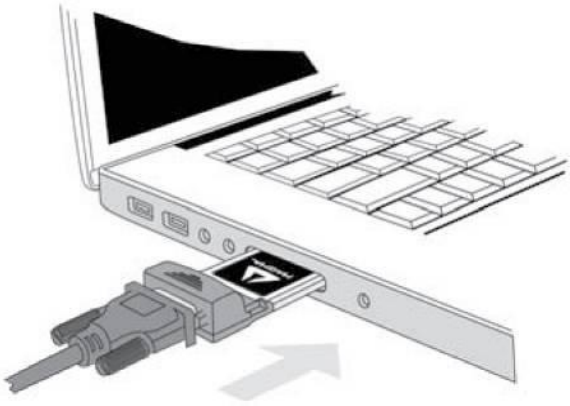
Picture B shows the Incorrect orientation:



PICTURE B

Before inserting the Magma ExpressCard, power down your laptop computer. Use the procedures for shutting down and powering off your system provided in your owner's manual or system documentation.

Insert the Magma ExpressCard module with the logo side up, into the ExpressCard slot on your computer. Gently push the card until it is firmly seated.



NOTE

The Magma ExpressCard module can only be used in a computer system that contains an ExpressCard slot. It will not function in CardBus or PCMCIA slots.

NOTE

If your laptop's ExpressCard slot is "spring-loaded", be sure that your ExpressCard is inserted correctly. It is very easy for this style slot to partially release a card if touched slightly.

For more information on using ExpressCard modules, please refer to your computer's user manual or system documentation.

4 Recheck the Installation

Check your installation **before** powering up the Magma expansion chassis for the first time. Although the power supply has an over voltage protection device built into it, it may not "trip" in time to fully protect a device that has been improperly connected, or whose power cable has been damaged.

CAUTION

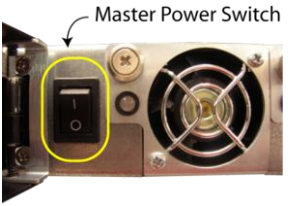
This product is provided with a power supply that automatically adjusts to input voltages between 100 to 240 Vac. A U.S. and Canadian 125 V power supply cord is provided with this product. If using this product outside of the U.S. or Canada, please use locally available power supply cords

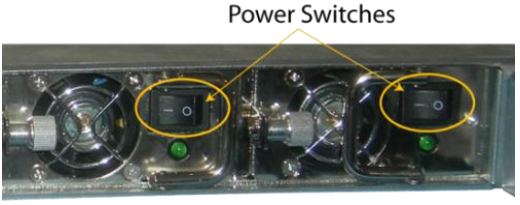
5 Applying Power Correctly

Starting Up:

You must apply power to the EB4-1U-X8 expansion chassis „BEFORE„ you power up your computer. This will allow the higher numbered PCIe buses in the PCIe bus hierarchy to be at a stable state when the host system issues its master power-on bus reset. In systems that perform automatic PCIe bus configuration, this will allow the configuration code to recognize the PCIe bus hierarchy and any attached devices.

There are three On/Off switches on the front of the chassis, directly behind the front panel, as well as LED indicators to indicate power status. The master power switch is located on the far left and individual power switches are located on each power supply. You must first turn on each of the individual power switches. Only then can the entire system be turned on using the master power switch.



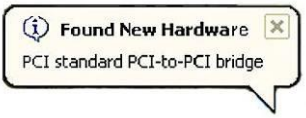


IMPORTANT

- Unless both redundant power supplies are turned on first, an alarm will sound once the master switch is activated (the system considering one of them as having failed).
- These 1+1 redundant power supplies are hot swappable, which means that the system can fully operate on one power supply while the other is removed for repair/replacement.
- If replacing a power supply, be sure to secure the new one in with its thumbscrew for better grounding and noise immunity.

Windows Start Up

As your Windows computer starts up, you will see a small message box pop-up in the lower-right corner of the screen to alert you that Windows has found new hardware.



The system does not require any Magma drivers in order to operate properly with the x8 PCIe Host card. However, it may require a driver in order to work with the optional ExpressCard host, hence we added the next section.

You may now proceed to Chapter 3 Verify Installation.

MAC Start Up

Apple MAC OS computers will boot up without any visible indicators that the Expansion System is connected. Go to: Chapter 3 Verify Installation.

RedHat 9 Linux Start Up

Similarly, RedHat9 OS computers will boot up without any visible indicators that the Expansion System is connected. Proceed to: Chapter 3 Verify Installation.

Software Driver Installation:

First it should be noted that a driver is NOT required for a non-Windows OS. It may or may not be required for a Windows XP installation depending on your host system BIOS. You should first install your 3rd Party card and connect the system as described earlier in this chapter. The Magma software drivers should be installed **only** if you are having problems accessing the expansion **or** if you require the HotPlug feature. Before attempting to install anything on a Windows XP system, you should ensure that you have set a new Restore Point.
See your Windows XP manual to learn how to set a new Restore Point. You should ensure that all data files are closed and that you have a current backup.

STOP

Before installing drivers, you should ensure that you have a current system backup of all of your important data.

Failure to follow these instructions exactly could result in a system lock-up and potential loss of data.

You must also disable your anti-virus software before continuing.

For achieving the best results when installing the Magma driver:

- Have a current system backup or restore point
- Reboot and Shut down each time you are prompted
- Be logged in as a 'System Administrator'

Install Driver

Open Magma's support website at:
http://www.magma.com/support/drivers/index.html

1 Unless noted otherwise, you will find the latest universal driver for all PCIe chasses listed on top of the older drivers on that page. If you encountered a windows error code previously, scroll down to locate a more specific driver for that error code.

2 Click on the Open button to create a C:\ExpressBox folder on your computer.

3 Click on the Winzip button to unpack the files into the C:\ExpressBox folder.

4 Click on the OK button to confirm the files are unpacked.

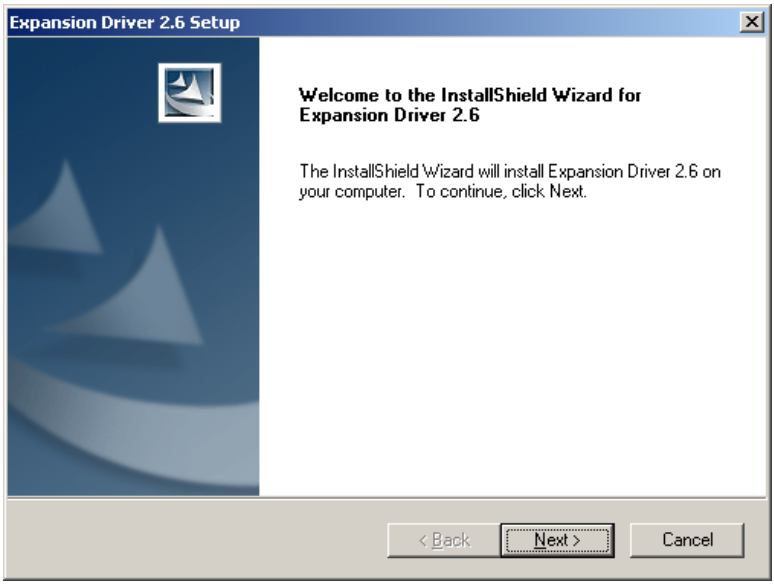
5 Click on the Close button to close WinZip.

6 Go to the C:\ExpressBox folder and double-click on the Setup.exe file to start the driver installation.

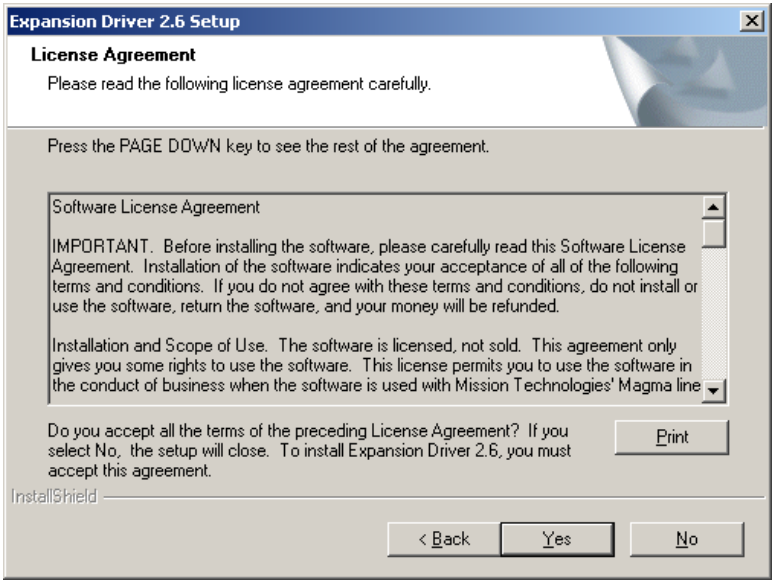
7 Follow instructions on the screen during the installation.

8 Reboot your computer.

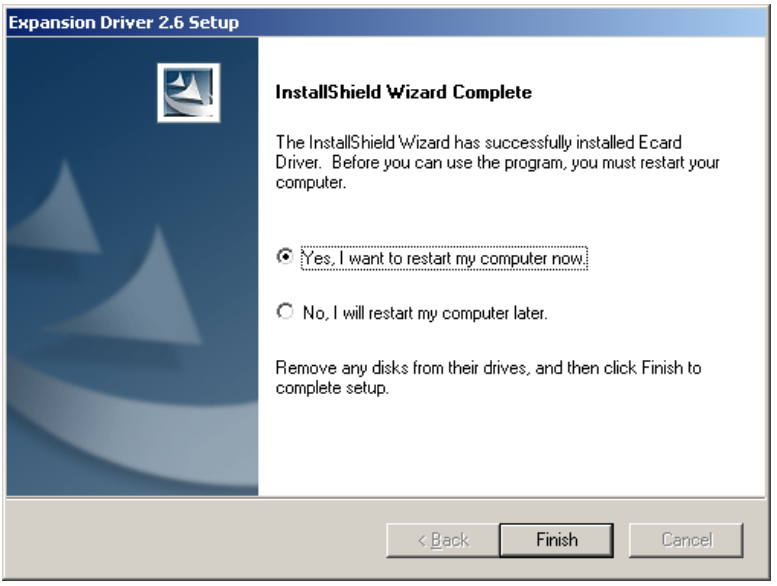
The setup program will prepare the necessary files and present the following window to start the driver installation.


Expansion Driver 2.6 Setup
Welcome to the InstallShield Wizard for Expansion Driver 2.6
The InstallShield Wizard will install Expansion Driver 2.6 on your computer. To continue, click Next.
< Back
Next >
Cancel

Click **Next** to continue and review the licensing agreement.


Expansion Driver 2.6 Setup
License Agreement
Please read the following license agreement carefully.
Press the PAGE DOWN key to see the rest of the agreement.
Software License Agreement
IMPORTANT. Before installing the software, please carefully read this Software License Agreement. Installation of the software indicates your acceptance of all of the following terms and conditions. If you do not agree with these terms and conditions, do not install or use the software, return the software, and your money will be refunded.
Installation and Scope of Use. The software is licensed, not sold. This agreement only gives you some rights to use the software. This license permits you to use the software in the conduct of business when the software is used with Mission Technologies' Magma line
Do you accept all the terms of the preceding License Agreement? If you select No, the setup will close. To install Expansion Driver 2.6, you must accept this agreement.
Print
InstallShield
< Back
Yes
No

Review the licensing agreement. If you agree, click **Yes** to continue. If you do not agree, click **No** to exit.


Expansion Driver 2.6 Setup
InstallShield Wizard Complete
The InstallShield Wizard has successfully installed Ecard Driver. Before you can use the program, you must restart your computer.
Yes, I want to restart my computer now.
No, I will restart my computer later.
Remove any disks from their drives, and then click Finish to complete setup.
< Back
Finish
Cancel

Rather than restarting your computer, it is recommended that you click "**No, I will restart my computer later.**", and then click **Finish**. You will be instructed to SHUT DOWN your computer in the next step.

IMPORTANT

If installing the Magma driver didn't produce the anticipated results please see Chapter 6 for information on how to contact Magma's Technical support team. While every attempt was made to produce as universal a driver as possible, there may be compatibility issues with some systems. At the same time, the driver is flexible enough to be customized to a client's system by turning specific internal functions on and off.

Shutting Down:

STOP

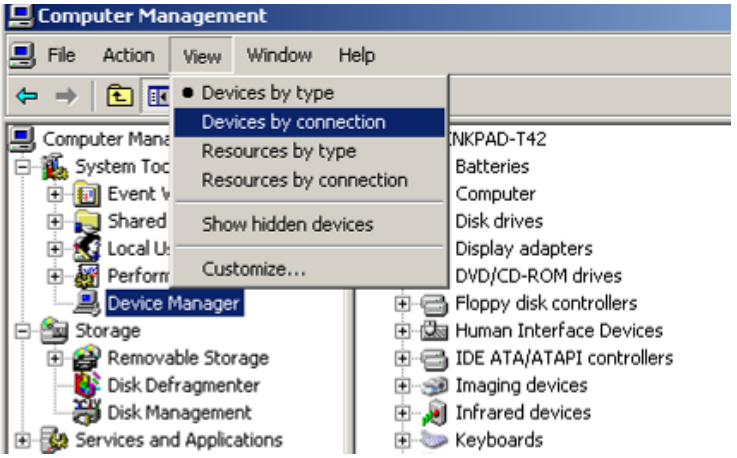
DO NOT TURN OFF THE MAGMA EXPANSION CHASSIS UNTIL YOU HAVE SHUT DOWN YOUR COMPUTER COMPLETELY! It can cause a system lockup and loss of any unsaved data.

When shutting your system down, it is recommended that you **first** shut down the computer correctly, and then power down the Magma expansion chassis to avoid 'computer lock-up' and potential data loss.

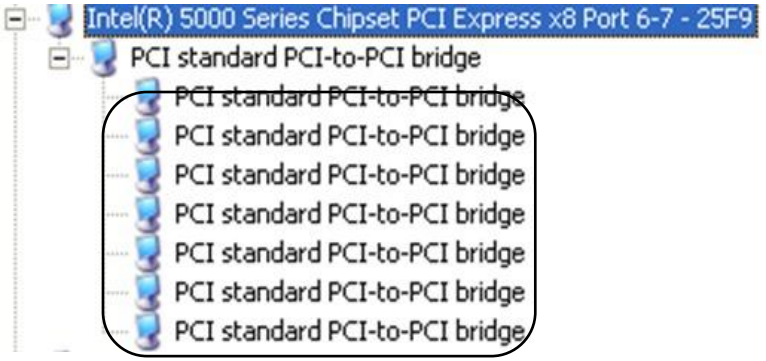
CHAPTER 3 Verify Installation

Windows

To verify a successful installation on Windows, find the '**My Computer**' icon and "right-click" on it. Then select '*Manage*' from the pop-up menu. Next, click on '*Device Manager*' in the leftmost Computer Management window. Finally, click on the *View Menu* and select *View Devices by Connection.*



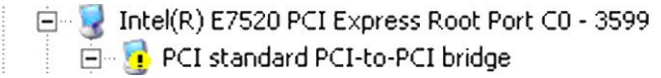
Open ACPI (BIOS) → Open PCI Bus→ Click the '+' sign several times until your reach a PCI Express Root Port with a PCI Standard PCI-to-PCI Bridge beneath it.


Intel(R) 5000 Series Chipset PCI Express x8 Port 6-7 - 25F9
PCI standard PCI-to-PCI bridge
PCI standard PCI-to-PCI bridge
PCI standard PCI-to-PCI bridge
PCI standard PCI-to-PCI bridge
PCI standard PCI-to-PCI bridge
PCI standard PCI-to-PCI bridge
PCI standard PCI-to-PCI bridge
PCI standard PCI-to-PCI bridge

When installed properly, you will see eight PCI Bridges (ports) below your system's PCIe Root port.

If the verification is successful, you may now proceed to Chapter 4 and install 3rd. Party PCIe Cards as well as auxiliary peripherals, such as hard drives into the chassis.

If, however, the installation was unsuccessful, you may not see the PCI to PCI Bridge, or it will have a small yellow in front of it as shown below:



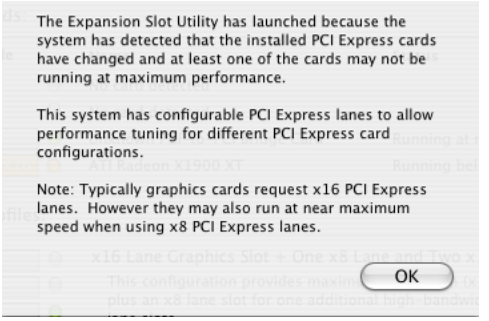
In that case proceed to Chapter 5 for Troubleshooting installation problems.

MacOSX

When using Mac OS X no additional software or drivers are needed. The operating system should automatically recognize the Magma host card and expansion chassis.

Expansion Slot Utility

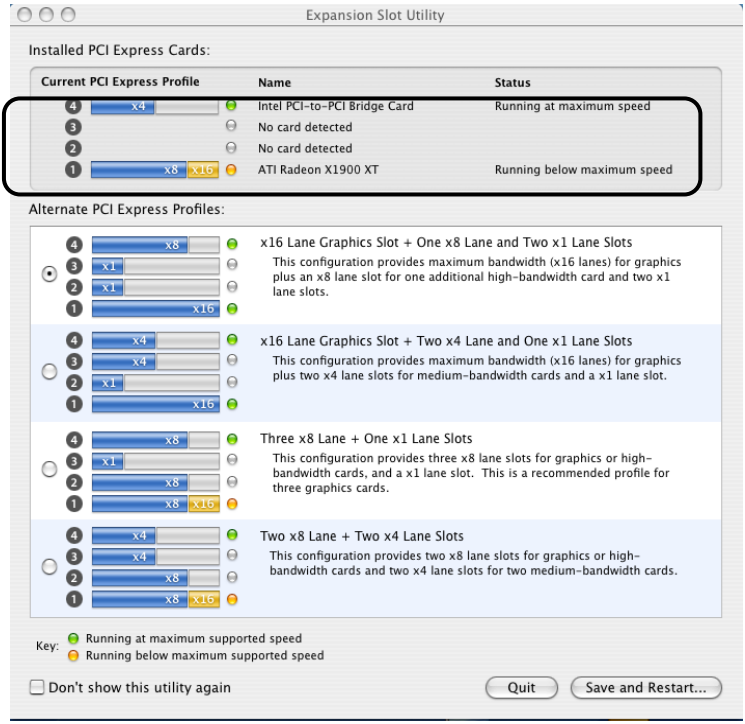
The following screen may be displayed the first time you turn on your computer with the Magma EB4-1U-X8 installed.


The Expansion Slot Utility has launched because the system has detected that the installed PCI Express cards have changed and at least one of the cards may not be running at maximum performance.
This system has configurable PCI Express lanes to allow performance tuning for different PCI Express card configurations.
Note: Typically graphics cards request x16 PCI Express lanes. However they may also run at near maximum speed when using x8 PCI Express lanes.
OK

Choose OK.

MacOS X is prompting you to choose a PCI Express profile that maximizes the performance of your attached devices. **The Magma host card can communicate up to a bandwidth of x8 to and from the expansion chassis and devices.** You should choose a profile that matches the configuration of all the cards installed in your Mac. Magma recommends that you install the system host card into a x8 slot in order to maximize throughput.

In this example, the Magma host card is installed in slot 4 and appears as “Intel PCI-to-PCI Bridge Card”.

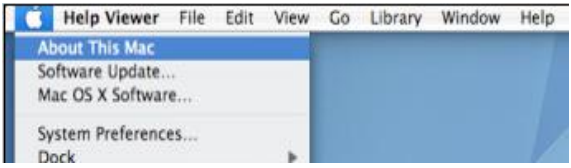

Expansion Slot Utility
Installed PCI Express Cards:
Current PCI Express Profile
Name
Status
Intel PCI-to-PCI Bridge Card
Running at maximum speed
No card detected
No card detected
ATI Radeon X1900 XT
Running below maximum speed
Alternate PCI Express Profiles:
x16 Lane Graphics Slot + One x8 Lane and Two x1 Lane Slots
This configuration provides maximum bandwidth (x16 lanes) for graphics plus an x8 lane slot for one additional high-bandwidth card and two x1 lane slots.
x16 Lane Graphics Slot + Two x4 Lane and One x1 Lane Slots
This configuration provides maximum bandwidth (x16 lanes) for graphics plus two x4 lane slots for medium-bandwidth cards and a x1 lane slot.
Three x8 Lane + One x1 Lane Slots
This configuration provides three x8 lane slots for graphics or high-bandwidth cards, and a x1 lane slot. This is a recommended profile for three graphics cards.
Two x8 Lane + Two x4 Lane Slots
This configuration provides two x8 lane slots for graphics or high-bandwidth cards and two x4 lane slots for two medium-bandwidth cards.
Key:
Running at maximum supported speed
Running below maximum supported speed
Don't show this utility again
Quit
Save and Restart...

If your computer did not automatically prompt you to choose a PCI Express profile, you can locate this utility under System → Library → CoreServices → Expansion Slot Utility.app.

Apple System Profiler

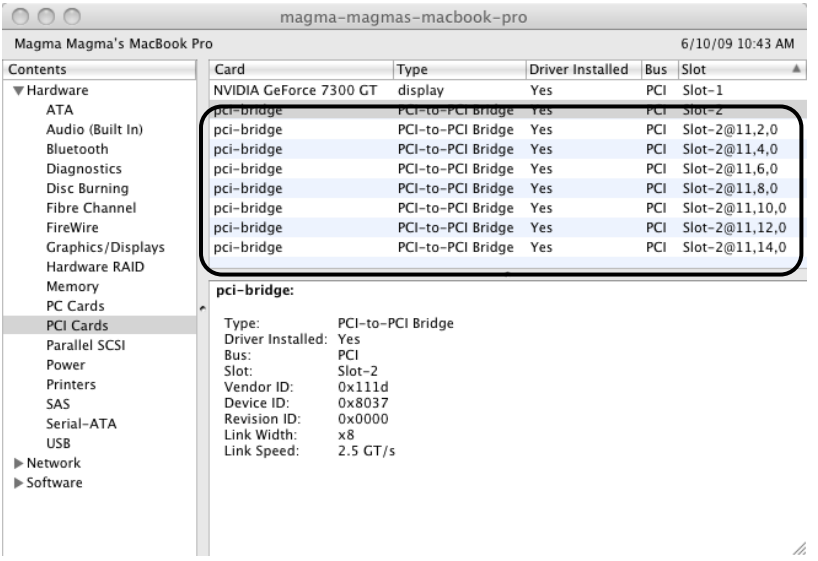
When using Mac OS X no additional software or drivers are needed. As long as you are using Mac OS X Version 10.4 or newer, the operating system should automatically recognize the Magma expansion chassis.

Select "About This Mac" under the Apple Icon



Then click the "More Info" button → click on the Devices tab→ you should see a **pci-bridge** device listed under PCI as shown below:

Any PCIe Cards you install in the expansion chassis will appear behind the **pci-bridge** device.



Mac OS 10.5.x

If any of these devices are not displayed as shown above, you should shut down your system (computer first, then the expansion chassis) and reconnect the cables and the PCIe expansion host card to ensure that you have a solid connection. Then restart the Magma expansion chassis followed by the computer. Next, try to verify the installation again, as shown above. If you are still having problems, contact Magma Technical Support at (858) 530-2511.

RedHat 9 Linux

Once the EB4-1U-X8 has been installed in a RedHat9-based system, its installation can be verified by typing the following command lines:

lspci –t Displays the overall structure of the PCIe expansion system

lspci –vv Lists additional information about the PCIe switch (in our case it will list the Integrated Device Technology (IDT) information.

lspci –vvv Displays the most comprehensive information about the expansion system.

Below we've shown the output corresponding to the **lscpi** command:

```
00:00.0 Host bridge: Intel Corporation Memory Controller Hub (rev 20)

00:01.0 PCI bridge: Intel Corporation PCI Express Port 1 (rev 20)

00:05.0 PCI bridge: Intel Corporation PCI Express Port 5 (rev 20)

00:09.0 PCI bridge: Intel Corporation PCI Express Port 9 (rev 20)

00:10.0 Host bridge: Intel Corporation FSB Registers (rev 20)

00:10.1 Host bridge: Intel Corporation FSB Registers (rev 20)

00:10.2 Host bridge: Intel Corporation FSB Registers (rev 20)

00:10.3 Host bridge: Intel Corporation FSB Registers (rev 20)

00:10.4 Host bridge: Intel Corporation FSB Registers (rev 20)

00:11.0 Host bridge: Intel Corporation Unknown device 4031 (rev 20)

00:15.0 Host bridge: Intel Corporation FBD Registers (rev 20)

00:15.1 Host bridge: Intel Corporation FBD Registers (rev 20)

00:16.0 Host bridge: Intel Corporation FBD Registers (rev 20)

00:16.1 Host bridge: Intel Corporation FBD Registers (rev 20)

00:1b.0 Audio device: Intel Corporation 631xESB/632xESB High Definition Audio Controller (rev 09)
```

lscpi command cont.

```
00:1c.0 PCI bridge: Intel Corporation 631xESB/632xESB/3100 Chipset PCI Express Root Port 1 (rev 09)
```

```
00:1c.1 PCI bridge: Intel Corporation 631xESB/632xESB/3100 Chipset
PCI Express Root Port 2 (rev 09)

00:1d.0 USB Controller: Intel Corporation 631xESB/632xESB/3100
Chipset UHCI USB Controller #1 (rev 09)

00:1d.1 USB Controller: Intel Corporation 631xESB/632xESB/3100
Chipset UHCI USB Controller #2 (rev 09)

00:1d.2 USB Controller: Intel Corporation 631xESB/632xESB/3100
Chipset UHCI USB Controller #3 (rev 09)

00:1d.3 USB Controller: Intel Corporation 631xESB/632xESB/3100
Chipset UHCI USB Controller #4 (rev 09)

00:1d.7 USB Controller: Intel Corporation 631xESB/632xESB/3100
Chipset EHCI USB2 Controller (rev 09)

00:1e.0 PCI bridge: Intel Corporation 82801 PCI Bridge (rev d9)

00:1f.0 ISA bridge: Intel Corporation 631xESB/632xESB/3100 Chipset
LPC Interface Controller (rev 09)

00:1f.1 IDE interface: Intel Corporation 631xESB/632xESB IDE
Controller (rev 09)

00:1f.2 RAID bus controller: Intel Corporation 631xESB/632xESB SATA
RAID Controller (rev 09)

00:1f.3 SMBus: Intel Corporation 631xESB/632xESB/3100 Chipset
SMBus Controller (rev 09)

01:00.0 VGA compatible controller: nVidia Corporation Unknown device
040e (rev a1)
```

The highlighted segment below of the **lscpi** command corresponds to the Magma expansion system:

```
02:00.0 PCI bridge: Integrated Device Technology, Inc. Unknown device
8037

03:02.0 PCI bridge: Integrated Device Technology, Inc. Unknown device
8037
```

03:04.0 PCI bridge: Integrated Device Technology, Inc. Unknown device 8037

03:06.0 PCI bridge: Integrated Device Technology, Inc. Unknown device 8037

03:08.0 PCI bridge: Integrated Device Technology, Inc. Unknown device 8037

03:0a.0 PCI bridge: Integrated Device Technology, Inc. Unknown device 8037

03:0c.0 PCI bridge: Integrated Device Technology, Inc. Unknown device 8037

03:0e.0 PCI bridge: Integrated Device Technology, Inc. Unknown device 8037

0b:00.0 PCI bridge: Intel Corporation 6311ESB/6321ESB PCI Express Upstream Port (rev 01)

0b:00.3 PCI bridge: Intel Corporation 6311ESB/6321ESB PCI Express to PCI-X Bridge (rev 01)

0c:00.0 PCI bridge: Intel Corporation 6311ESB/6321ESB PCI Express Downstream Port E1 (rev 01)

0f:00.0 Ethernet controller: Broadcom Corporation NetXtreme BCM5754 Gigabit Ethernet PCI Express (rev 02)

10:00.0 Ethernet controller: Broadcom Corporation NetXtreme BCM5754 Gigabit Ethernet PCI Express (rev 02)

Chapter 4 Install Cards and Drives

This chapter provides information on how to install 3rd Party PCIe cards into your MAGMA expansion chassis. More details on the installation of individual cards are provided by the card's manufacturer. This chapter is provided as a simple guide to help you install your PCIe cards in the chassis.

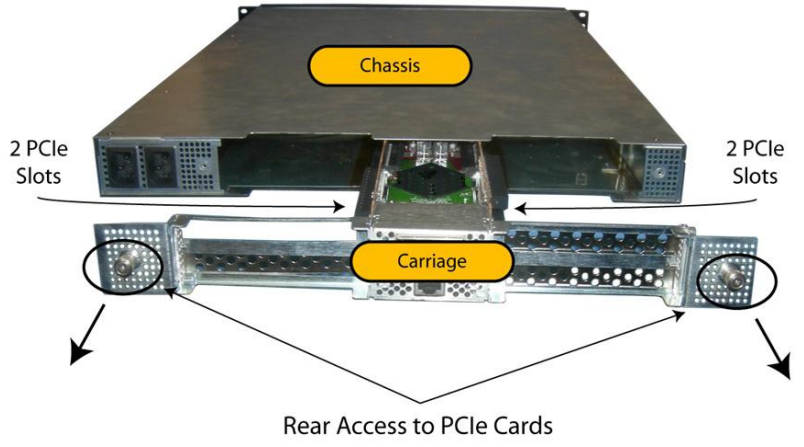
For the purpose of installation, the MAGMA expansion chassis functions exactly as a standard desktop computer chassis. Always follow the manufacturer's instructions for installing their card or hard drive on a desktop computer.

IMPORTANT

We will provide reasonable technical support with 3rd Party PCIe cards. However, if you have verified a successful installation of the MAGMA expansion system (as defined in Chapter 3), but experience difficulty installing your 3rd Party PCIe cards, the card manufacturer should be able to provide the best support.

1 Open PCIe Expansion Chassis

Two (2) thumbscrews secure the PCIe slots in the expansion chassis. Loosen these screws and pull to slide the PCIe slots out.



Turn Thumbscrews Counter-Clockwise to loosen.
Pull to open Chassis and gain access to PCIe slots in Carriage.

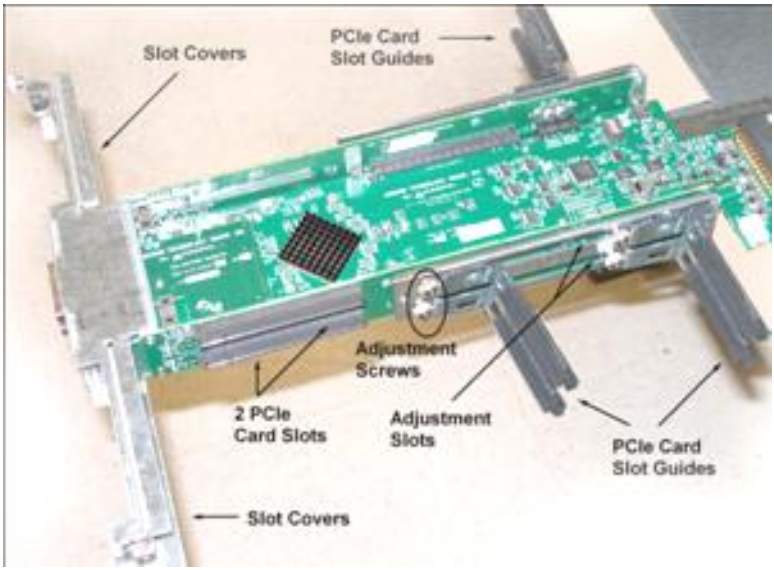
2 Install 3rd Party PCIe Cards

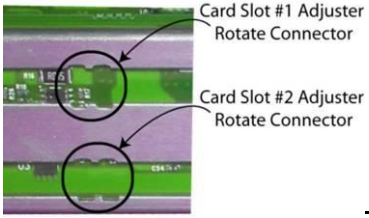
CAUTION

When installing PCIe cards, please ensure that the input current rating specified on the AC input label is not exceeded.

Installing 3rd Party PCIe Cards

The EB4-1U-X8 chassis provides space for up to four (4) PCIe cards. Generally, it makes no difference which PCIe slot you use when installing your 3rd Party PCIe cards in the MAGMA expansion chassis, unless specified by the card manufacturer. As can be seen in the following graphic, each of the four PCIe slots has a sliding slot guide to allow you to install any size PCIe card. Simply loosen the adjustment screw for the slot you are using and slide is forward or backward until the card fits snugly. Then tighten the adjustment screw and secure the card to the slot cover using the screw provided.





If your PCIe card is too short for the adjustable card slot guides, you can rotate the slot guard to make it fit. Simply loosen the adjustment screw for the slot you are using and slide the guard to pivot hole, as shown, and remove it.

Next, rotate the slot guard 180° and reinsert it. Finally, adjust the card slot guard to fit the card's length.

Be sure to install your PCIe cards following the PCIe card manufacturer's recommendations. Some PCIe card manufacturers recommend that you install their software driver(s) prior to installing the hardware. If this is the case, you should install their driver before you connect and power up the expansion chassis.

Make sure that all PCIe cards are fully seated in their connectors. When correctly seated in its connector, you will notice a firm resistance when you pull up gently on the card. To keep the cards in place, secure them in the enclosure with their retaining screws (supplied with the MAGMA expansion chassis).

IMPORTANT

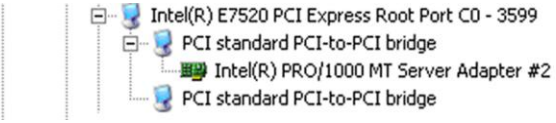
The sheer number of PCIe cards and device drivers available makes it impossible for Magma to fully test and certify all available PCIe cards for use in the MAGMA expansion chassis. Our best advice to you in this regard is to insist on full PCIe Specification compliance from your card and system vendors. Cards and systems should be at least PCIe Specification Revision 1.0 compliant or better. Compliance in your system motherboard, PCIe cards, and console firmware (or BIOS) is your best assurance that everything will install and operate smoothly.

Not all PCIe cards are as "well-behaved" as they should be. Sometimes simply moving a PCIe card that is having a problem to a different slot, or reordering your cards in their slots, will alleviate "behavior" problems.

System Should Be Up and Running

Apply power to the MAGMA expansion chassis first, then power up the computer.

Use the procedures detailed in Chapter 3 to confirm the card installation(s) in the Windows Device Manager or Apple System Profiler. When everything is functioning correctly, your Windows Device Manager should look something like this:


Intel(R) E7520 PCI Express Root Port C0 - 3599
PCI standard PCI-to-PCI bridge
Intel(R) PRO/1000 MT Server Adapter #2
PCI standard PCI-to-PCI bridge

If you discover that any of your 3rd Party PCIe cards contain a you have a problem with that card. Refer to Chapter 6 Troubleshooting for further guidance.

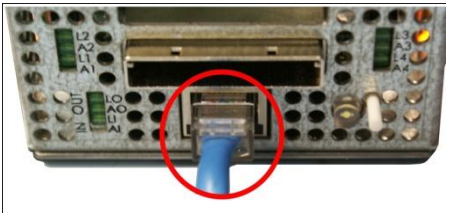
4 SNMP Features and Configuration

SNMP Features

Magma's EB4-1U-X8 chassis supports the Simple Network Management Protocol for remote monitoring and administration by offering the following features:

- Internal Temperature monitoring
- External Temperature monitoring
- Clear Alarm button monitoring
- Swappable fan status (for fans 1,2 and 3 in the front)
- Power supply 1 status
- Power supply 2 status
- Power supply fan 1 status
- Power supply fan 2 status
- 10 Traps are defined to alert the SNMP server in case of overheat or failure in any of the subsystems mentioned above
- Remote chassis turn on
- Configuration retrieval via standardized MIB file interface (see Retrieving the MIB file section)

SNMP Configuration



To ensure that you can successfully monitor your new system, you will need to connect it to a local or private hub using a standard RJ45 Ethernet Cable. Connect one end of the cable to the RJ45 port, located on the rear of the chassis, and the other end to your local area network connector. In case you connect the chassis to a local computer/laptop be sure to use a Hub with a regular network cable or a crossover cable without a Hub.

The SNMP module in the EB4-1U-X8 system is configured for DHCP access (though this setting can be changed as described in the next

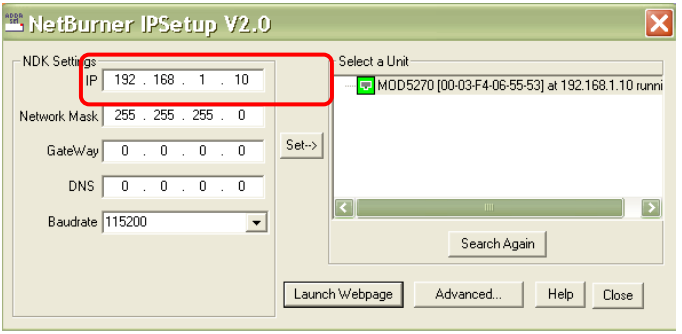
section). Once the chassis is turned on it will be assigned an IP address by your network's DHCP server.

If you have access to your network's DHCP server make sure to look up and write down that IP address. In any other case you will need to use the **IPsetup.exe** utility to discover the IP address that was assigned to the chassis. It can be downloaded at:

http://www.magma.com/support ,

Click Drivers and Utilities, search for IPsetup.exe

Double click on the utility icon after your chassis has been connected to the network and powered on. It will then identify your chassis based on its MAC address and display the following information:



In this case the IPsetup utility has found the EB4-1U-X8 chassis at IP address 192.168.1.10 .

To verify we've successfully detected the EB4-1U-X8 on our network press on the **Launch Webpage** button or open your browser and direct it to the new found IP address of the chassis (in our case it will be: http://10.203.0.186).

CAUTION

Caution

Aside from reading an IP address, the IPsetup.exe utility can be used to set an IP address other than the one assigned initially by the DHCP server—using the Set button. It is recommended, however, not to use the utility for this purpose since we will loose connectivity with the chassis until the machine running IPsetup.exe obtains an IP address in the same IP subnet. The next section will show a preferred way of accomplishing this via the browser interface. In case you need to back-trace any of these steps, you can always reset the chassis back to its factory settings.

Configure Network Settings

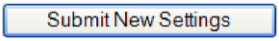
Open your browser and enter the IP address in the URL window and press **Enter**. The following browser window will open up:

The initial page provides status information and no username or password is required. If the main power switch is off, then this page will show the IP Address that is currently assigned to the chassis, the IP Address that will receive trap information, the temperature settings and that the chassis is powered off. To make changes to your settings you will need to follow the "Chassis Settings" Link. This page is password protected and before access is given the following dialog will appear

The factory settings will define the *User name* to be "**default**" and the *password* to be "**magma**". Enter these values in the appropriate field and select OK. If the username and password have not been changed from the factory settings, the Device Network Settings page will appear. If not see your network administrator for the correct user name and password.

To change the IP address, enter the new static IP address in the IP Address field. Enter the new subnet mask in the Network Mask field. Enter the IP addresses for the Gateway and the DNS Server in the appropriate fields. Finally, enter the network name of the EB4-1U-X8 in the DHCP Device Name field for use when accessing the chassis when DHCP is enabled. If you wish to use **DHCP**, enter 0.0.0.0 in the IP Address field.

When you have finished configuring the network settings, you can either configure the SNMP settings as described in the next section, change the default user name and password, or save the current changes by clicking on the **Submit New Settings** button at the bottom of the screen.



Now you can connect your chassis to the network. To find the IP address assigned by your DHCP server, look in the DHCP server's list of attached devices for the name you assigned to your EB4-1U-X8 chassis. The default name is Magma_EB4-1U.

Configure SNMP Settings

If you are adding your EB4-1U-X8 chassis to an existing SNMP network, or if you are planning to trap SNMP errors, you will need to configure the SNMP settings for use with your SNMP agent.

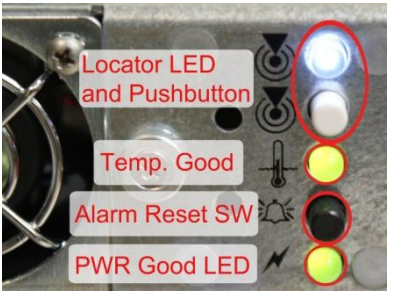
The default values for the SNMP settings are shown in the following graphic. The EB4-1U-X8 chassis monitors two temperature sensors; (one in the front of the chassis and one in the rear of the chassis); three fans; and two redundant power supply modules.

To configure these values for your SNMP network, simply change the default values to match your requirements.

Change the **Read Community Name** and **Write Community Name** fields to match those required by your SNMP network. The default value is *public*.

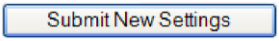
Change the **Trap Destination IP Address** to the IP address of the computer getting the SNMP data. The default **Trap Destination IP address** in the above example was: *10.203.11.15*.

Change the **Alarm Settings** for both the **Front** and **Rear Alarm** settings by entering both a high and low temperature in the appropriate fields. Any time the temperature in the chassis changes above or below these limits, an audible alarm will sound and the Temp. Light will change color from green to red. The same applies to the bottom PWR LED, in case one of the redundant power supplies fails. Aside from the LEDs changing colors, an alarm will sound in both cases, which can be reset by



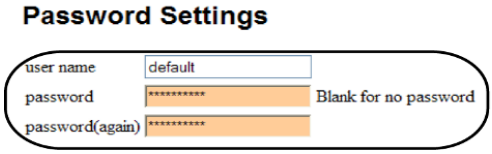
pressing the black reset switch in the middle. The Locator LED visually displays traps and can be turned off by pressing either the white pushbutton in the front or the one located in the back of the chassis.

When you have finished configuring the SNMP settings, you can either configure the network settings as described in the previous section, change the default user name and password as described below, or save the current changes by clicking on the **Submit New Settings** button at the bottom of the screen.



Change User Name and Password

This section allows you to change the default **user name** (*default*) and **password** (*magma*). To change the **user name**, simply enter your new user name in the **user name** field. To change your password, enter your new password in the **password** field. Enter it again in the **password(again)** field. The password in both fields must match before

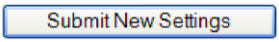


they can be accepted.

Reset to Default Values

You can restore your EB4-1U-X8 chassis to the factory default values by pressing and holding the Alarm Reset Button for 10 seconds the Power LED will blink during this 10 second period. When all values have been restored, the LED will stop blinking and turn off.

When you have finished changing the default user name and password, you can either configure the network settings or configuring the SNMP settings as described in previous sections, or save the current changes by clicking on the **Submit New Settings** button at the bottom of the screen.



IMPORTANT

The **user name** and **password** fields are case-sensitive.

Configure your SNMP Agent

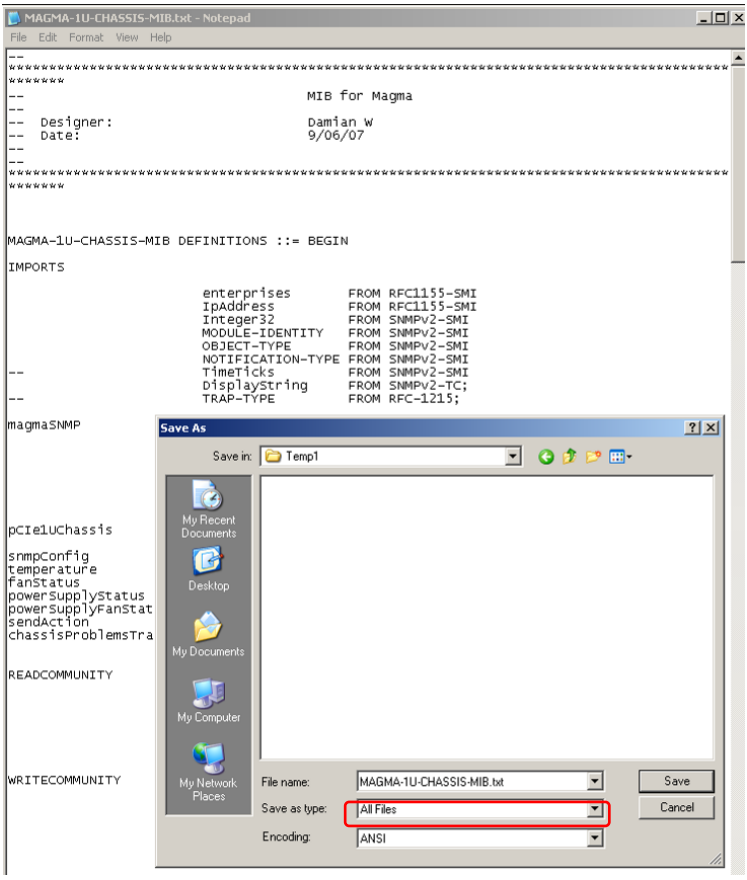
If you use an SNMP agent to help you monitor your network, you will find all necessary monitoring information in the MIB file.

Retrieving the MIB File

The MIB file is available for download at http://www.magma.com/support, select Driver and Utilities and then search for MIB.

After you click on the MIB file link, the information you need to configure your SNMP agent will be displayed on the screen in Notepad (or equivalent text editor).

To save this information click on File → Save As, then switch the entry "Save As Type" to: "All Files" as shown below:

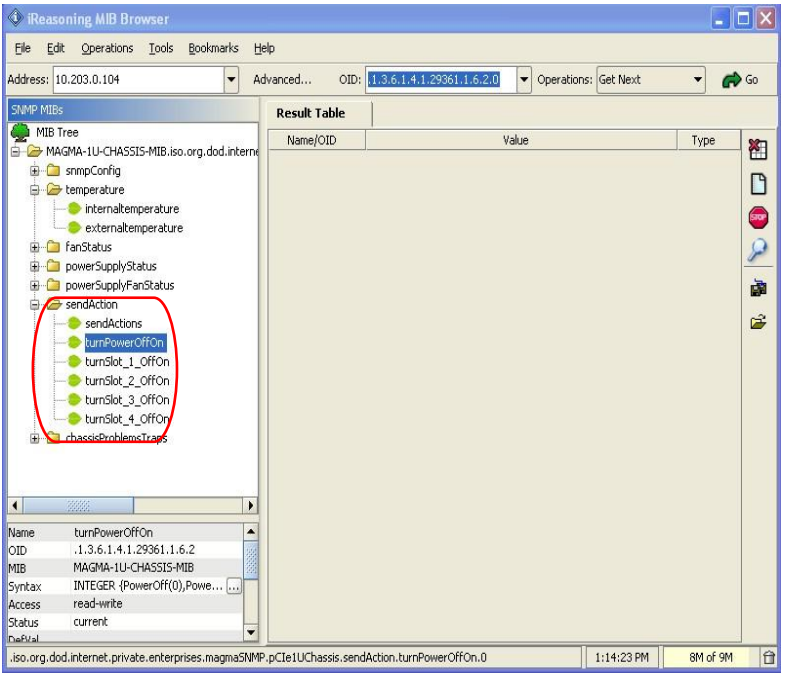


Once the MIB file is saved it can now be copied and loaded locally or to a remote server.

Accessing the various SNMP functions

Once the MIB file has been loaded to an SNMP server (via a front-end software typically called a MIB Browser) we can read in status information and set up specific functions otherwise not available via the Web interface.

The MIB Browser (or equivalent front-end SNMP software) will display the Magma chassis MIB contents in an explorer-like, Tree interface. A snapshot form the MIB Browser by iReasoning is shown below:

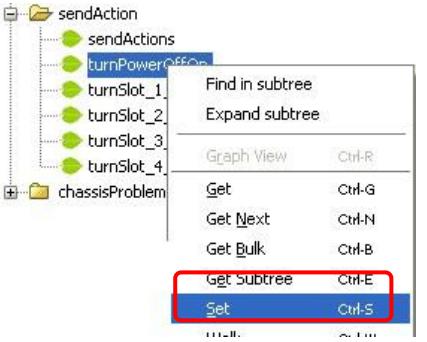


Under the MIB Tree, the Magma Chassis will have status information that can be read by expanding the respective folders. This information is also available in the Web interface mentioned previously.
In addition, if we expand the *sendAction* folder (as shown above) we gain access to "writable" functions that essentially allow us to remote-control the chassis.

Remote Chassis Reset (*turnPowerOffOn*)

This function allows us to remotely turn the chassis off and on.

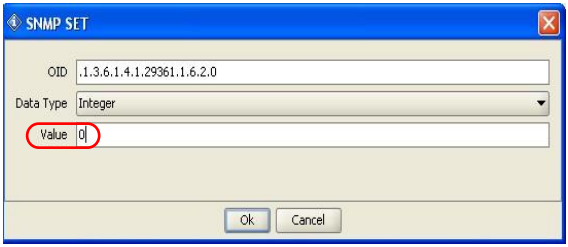
Right-click on it, and an options menu will appear. Select the Set command:



A dialog box will open where we can set the integer value to either:

"1"= True (**Turn ON**)

"0"= False (**Turn OFF**)



IMPORTANT

In order to successfully apply this function you must first set the SNMP Power-on Jumper in the position between PS_ON and ON_BY_MCU. This is **not** the default position of that jumper.

Additionally, the chassis' master on/off switch as well as each of the redundant power supplies' switches must be turned ON.

Remote Slot Power to the Chassis (*turnSlot_x_OffOn*)

This function allows us to remotely power on specific slots in the chassis without it being connected to a Host system, but via the RJ-45 Ethernet interface only. The *X* in the name above refers to slots 1-to-4.

In a similar manner to the *turnPowerOffOn* function, each of the four *turnSlot_x_OffOn* functions accept an integer value of **"1"** to turn power **ON** to the respective slot and **"0"** for turning it **OFF** in the Set command.

IMPORTANT

In order to successfully apply this function you must first disable the **HotPlug** and enable the **Independent Power** settings in the Alternate Function DIP switch. Having both turned on will cause erratic behavior once the Hotplug system tries to shut down power to a slot otherwise forced on by independent power.

Additionally, the chassis' master on/off switch as well as each of the redundant power supplies' switches must be turned ON.

5 Finishing Touches

After your system is working properly, replace any empty slots with slot covers, replace the host computer cover, and the close the expansion chassis carriage.

"Hot-Swappable" PCIe Card Installations

New PCI Express technology allows you to remove your 3rd Party PCIe cards for maintenance or replacement – without shutting down the system. The EB4-1U-X8 expansions system supports Hot Plugging/Hot Swapping of cards as defined by the PCI express specifications.

By design, this feature allows the host PC to gracefully remove power to a slot, so that a PCIe card can be removed and replaced. It then powers on the new card in coordination with the PC's operating system. By default, the EB4-1U-X8 ships with this feature turned on.

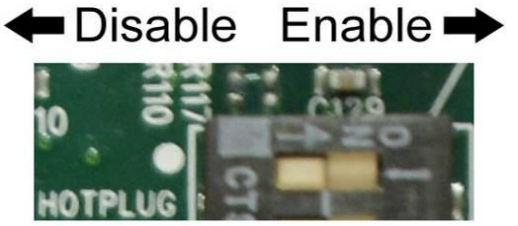
IMPORTANT

For this feature to work, you need to install the Magma HotPlug software driver. See Chapter 2 for instructions on how to download the latest software for your system.

IMPORTANT

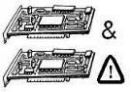
There are cases in which you would wish to turn off this feature, especially if the PCIe cards you plan on installing in the EB4-1U-X8 chassis require or adhere to a different timing budget than allowed in the PCIe specifications.

In order to turn off Hot-plug/Hot-swap, toggle the top actuator on the Chassis Alternate Function DIP Switch from its default right position to the left as shown below:



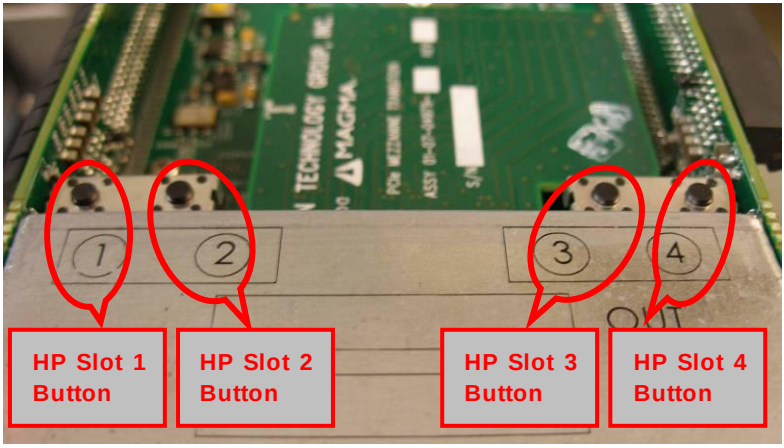
If you have any doubts, please check with you card's vendor that no such constrains exist for this card.

COMPATIBILITY ISSUE



A documented compatibility issue exists between an Apple's MacBook Pro and G5 systems in conjunction with the EB4-1U-X8 chassis on which is connected an ATTO Technologies' UL5D PCIe SCSI adapter. In this configuration, the Hot Plug feature needs to be disabled, otherwise the system won't boot.

Each of the PCIe slots is controlled by a Hotplug (HP) pushbutton. The buttons are labeled 1-4 in silkscreen on top of the card carriage:



Simply press the Attention Pushbutton corresponding to the slot you wish to "power-down." The power will now be removed from that slot so that the card can be replaced. All other PCIe cards remain fully functional, as they are independent of this slot. Below is the outlined procedure step-by-step:

Procedure for hot-un-plugging a PCIe plug in card:

1. Given a stable Windows-based system booted with the Magma chassis, an applet on the right hand side of the start menu bar should appear depicting a card with a green arrow above it.

   Double click on the applet.

2. A dialog should appear with the title "Safely Remove Hardware" in the dialog will be a list of devices that may be removed from the system. Within this list will be the cards currently plugged into the chassis.

   Select a device and click on the "Properties button".

3. If the device is currently in the Magma chassis, the location will show "Magma chassis *x* slot *y*". Where *x* identifies the physical chassis and *y* identifies the slot the device is plugged into.

   After verifying that this is the device to be removed, click on the OK button to close the new dialog.

4. The properties dialog should close and the original “Safely Remove Hardware” dialog should remain.

   Click on the Stop button of the dialog.

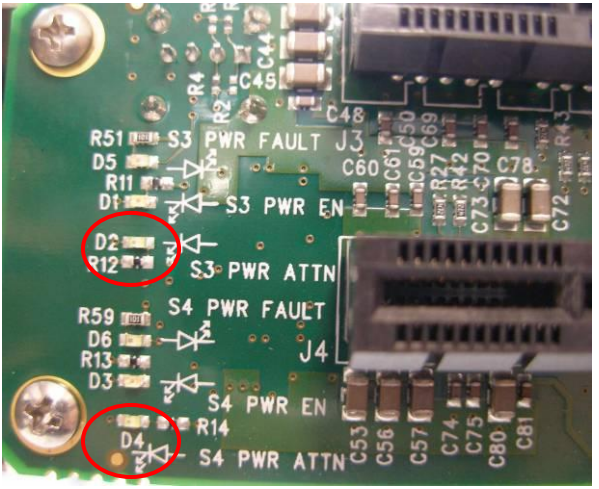
5. A dialog with the title “Stop a Hardware device” should appear. This device is used to confirm that the user wishes to stop this device.

   Click on the OK button of the new dialog.

6. After a brief period a pop up will appear telling the user that the device may be removed safely, and the device will be removed from the list of the original dialog.

   In the chassis, press the Attention Button that corresponds to the slot where the device is located.

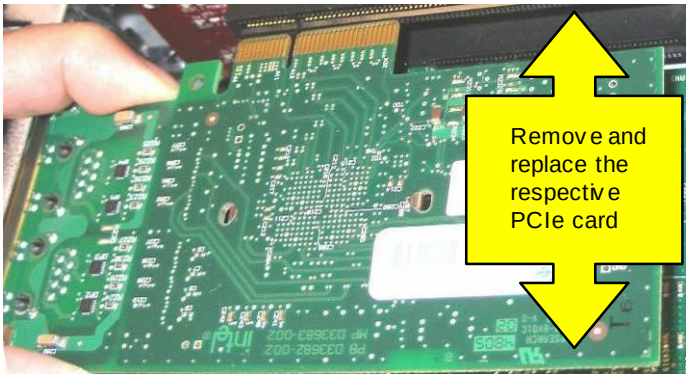
7. An LED, labeled *Sx PWR ATTN* (where **X** corresponds to the slot number) will begin to flash. The LEDs are located on the vertical backplanes towards the back edge of the chassis as shown below:



<u>Note:</u> If, by mistake, you've pressed the button corresponding to the wrong slot, then press it again within 5 seconds and the hot plug request will be ignored. Otherwise continue to step 8.

8. After 5-6 seconds the LED will stop flashing and turn off completely.

Remove the card and replace it with a new one. Then press the button again.



IMPORTANT

Ideally the PCIe card that was removed from the system will be replaced with an identical, working card. Replacing that card with one that has a different function or purpose may cause the system to crash due to a mismatch in the resources pre-allocated by the operating system.

9. The LED should start flashing again.

   If power should not be applied to this slot, immediately press the button again and the LED will stop flashing and remain off, otherwise go to step 10.

10. After 5-6 seconds the LED will stop flashing and remain on.

    After a brief period the new device will be recognized by the system, and it should be added back to the list in the "Safely Remove Hardware" dialog.

PCIe Expansion Solutions with the EB4-1U-X8

In the following section we will take a look at possible PCI Express expansion solutions using Magma's EB4-1U-X8 chassis.

Digi Design Pro Tools®

Pro Tools® is a comprehensive solution for professional music editing. It offers advanced capabilities for recording and manipulation of music by controlling a large number of music tracks.

This is done using at least one PCIe card with multiple Digital Signal Processor (DSP) chips onboard. From a system's standpoint, the more PCIe cards (and hence DSP chips) are available, the more tracks can be edited and recorded digitally for a better final result.

By combining the power of PCIe expansion through an EB4-1U-X8 system with multiple such PCIe cards, the same PC can record substantially more tracks. Additionally the same system may contain a storage controller (SAS/SATA/SCSI) and the hard drives for actually recording the tracks – all inside one box, freeing much of the PC hardware for other tasks.

The table below shows a comparison between PCI and PCIe cards in terms of the number of recorded tracks.

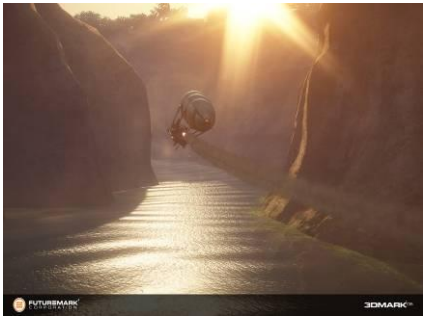
Sampled Frequency	No. of tracks out of maximum possible	Description/Notes
48KHz	192 out of 192	Using Magma ExpressBox2 PCIe Expansion system
96KHz	96 out of 96	
192 KHz	36 out of 36	
48KHz	144 out of 192	Using Magma CB2 PCI Expansion
96KHz	96 out of 96	
192 KHz	13 out of 36	

Note that the maximum number of tracks is achieved with all PCIe cards inserted directly into the PC. Using the EB4-1U-X8 expansion chassis we note the difference in track counts is no larger than 20% compared to a scenario where all cards reside in the PC, taking up all available slots.

Video Card expansion solutions

Magma's EB4-1U-X8 chassis can be used to add a high end PCI express video card to a PC system or laptop that were not equipped with such a device for various reasons: cost , physical space, heat dissipation etc.

A question then arises as to how good of a performance we can get by utilizing the expanded PCIe bus and high end video card . In order to obtain a definitive answer we turn to Futuremark's 3DMark® benchmarking software. Since its introduction at the turn of the millennium, 3DMark® has become the de-facto standard in Video card performance testing and evaluation.



3DMark Score
Score
3DMARK06
To obtain the 3DMark score you need to run all Graphics, and CPU tests supported by your hardware.
SM2.0 Score: 3774
HDR/SM3.0 Score: 3843
CPU Score: N/A
Submit Your Results...
Submit to view and compare your benchmark result details online using the Online ResultBrowser
Details...
To Excel
Save as...
Close

The 3DMark® suite is optimized to work under Windows Vista and supports the latest DirectX and derivative 3D multimedia technologies. In this environment, a low-profile Dell PowerEdge server (with a built-in ATI ES1000 video chipset) was tested with various external PCIe video cards.

Since the built-in video chipset doesn't support 3D rendering needed to run 3DMark® , we first established a baseline by installing an entry level PCIe card into an EB4-1U-X8 expansion chassis (Nvidia Quadro NVS440).

All subsequent benchmarks were completed using higher performing video cards and documented in the table below:

Tested Video Card	SM2.0 Benchmark Score	SM3.0 Benchmark Score
NVidia Quadro NVS440	151	182
NVidia Quadro FX560	229	479
ATI 1650 Pro	757	773
NVidia GeFORCE 7600GS	861	768
NVidia Quadro FX1500	1048	979
NVidia GeFORCE 7900GS	1582	1528
ATI 1900XT	2286	2504
NVidia Quadro FX5600	3678	3412
NVidia 8800 Ultra	3774	3843

The comparison table shows performance improvements from 263% to 2111% between the baseline and the highest-end video card tested (the NVidia GeFORCE 8800 Ultra). In other words, by expanding the PCI Express bus, the EB4-1U-X8 system was able to facilitate an ever-improving benchmark result limited only by the 3rd party card's performance and the bandwidth limitations of the bus itself.

For more details on the actual test methodology and an explanation of the benchmark figures please refer to: www.futuremark.com

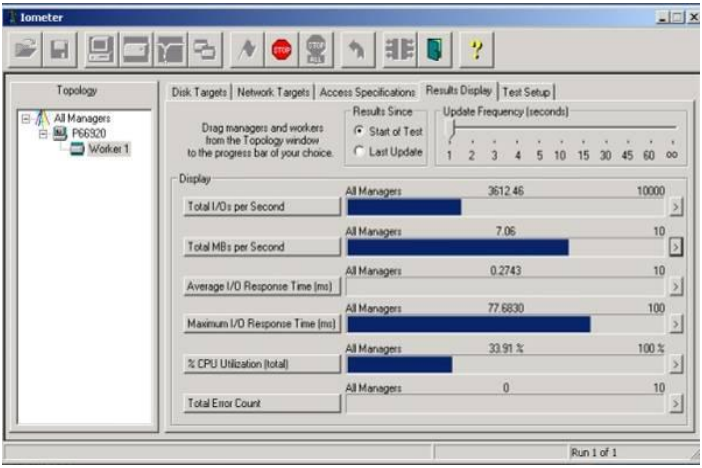
High Throughput storage solutions

The growing demand for storage solutions in the past few years was one of the major catalysts behind the exponential growth in hard drive capacity. Moreover, a new breed of faster and more efficient interfaces have emerged in order to provide higher throughput while maintaining the lowest possible delays in accessing our data.

One such solution is ATTO Technology's FC-44ES Fibre Channel PCIe controller. It can reach data transfer rates of up to 800MB/sec per channel when taking full advantage of the PCI Express bandwidth.

But what if this impressive performance is still not enough to satisfy a bandwidth-hungry application such as a multi-dimensional database, or a high-definition, real time, video streaming broadcast? In that case, the EB4-1U-X8 becomes an obvious solution by allowing the user to combine up to 4 Fibre Channel controllers into one system, which, in turn, only compromises a single PCIe slot out of the ones available in the host computer.

Assuming we acquired the necessary hardware (controllers, the fiber medium and an array of high-speed storage devices) the question that arises is: How can we quantify the power of multiple controller cards? The answer lies in an open-source application, vastly popular among those working in the storage industry: Iometer® (see screenshot below)

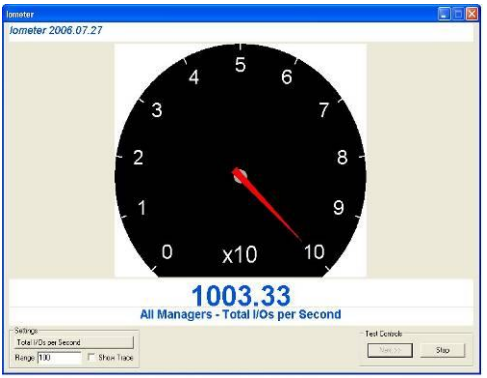


Iometer® is a software-based I/O exerciser capable to test and characterize stand-alone as well as clustered storage systems.

Developed originally by Intel as a proprietary tool, it eventually became part of the Open Source Development Lab (OSDL) from which point it has undergone several revisions and updates.

Going back to the Fibre channel host controller cards, one of the features that the ATTO FC-44ES supports is the creation of multiple, small virtual drives that can be striped by the OS for faster access. What that translates to is the ability of two cards to communicate amongst themselves at the fastest possible rate, unaffected by delays otherwise encountered by moving parts in an actual disk drive.

By using this method combined with the Iometer® application, one can benchmark the communication channel and verify that the PCIe express link is utilized to its fullest potential.



In the example below, a single ATTO FC-44ES card was installed into one of the 4 PCIe expansion slots provided by the EB4-1U-X8 chassis. It was then connected via fiber optic cables to a second FC-44ES card (set to simulate a fibre disk array, by using a striped set of small virtual drives). Three tests were performed using Iometer. In the first, an equal amount of read and write threads were exercised between the two cards. The following two tests focused on either all-read or all-write threads. The test results are shown in the table below:

I/O Test type	Throughput [MByte/sec]
50% Reads; 50% Writes	1003.3
100% Reads	696.1
100% Writes	677.7

The results show an aggregate throughput exceeding 1GByte in the case where reads and writes are evenly split 50-50 and a slower, more realistic rate when only a single type of threads was exercised.

Chapter 5 Troubleshooting

Before discussing a troubleshooting methodology for locating the problem we will first introduce several indicators and configuration switches that provide general and specific information for this process.

Status Indicators and configuration switches for 01-04978-03

Host Card

The EB4-1u-x8G2 host card is set to x8 by default and can be verified by SW2. Page 7 in manual

D2 -- x8
D6 --x4
D7 --x2
D8 --x1

D9 -- Loss of Lock/Loss of Signal asserted (when ON)
D12 -- PCIe CLK good (when ON)
D14 -- Reset# asserted (when ON)

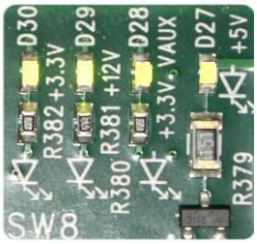
If the D12 LED is ON and the D14 LED is OFF and all other link LEDs are OFF that means that no link has been established, check both host and expansion to see, as one can be indicating proper link operation(i.e. expansion) while the other (i.e. host) can be indicating no link (all link LEDS OFF).
Also note, that after the first time the power is applied and not turned off the D12 (clk good) LED will remain ON until the main power gets turned OFF to the system.

Status Indicators and configuration switches

Under normal operating conditions the status indicators are for internal Magma troubleshooting while the configuration switches/jumpers should remain in their default state preset by Magma for best compatibility.

However, should a problem occur with the chassis (or a special mode of operation be solicited by the client) we included below explanations as to what all these items are and how they should be treated:

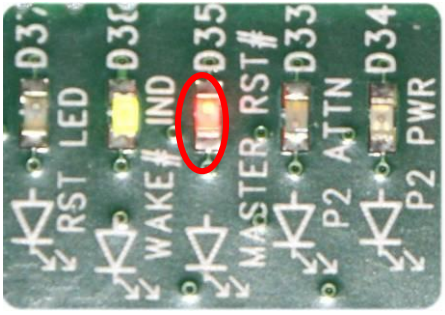
Chassis Power Good Indicators:



As long as all power supply voltages are properly regulated to +5V, +12V, +3.3V and +3.3V AUX, the LEDs D27, D29, D30 and D28 will light up respectively as follows:

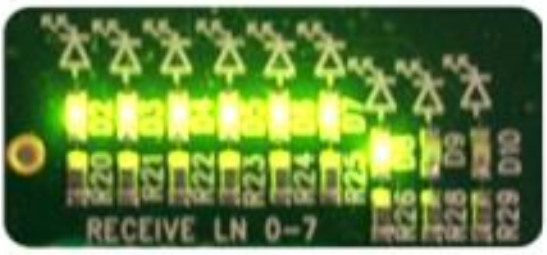
Chassis RESET Indicators:

Under normal operating conditions RESET lights for the slots should be off, with the exception of RST# CB and the moment when any slot RESET is applied (RST SL1-4#). In case that the chassis is on but the Host system is turned off, then the MASTER RST# will be on as shown below:



Chassis Signal Detect Indicators:

This group of LEDs (D1-D10) indicates the existence of PCIe traffic on the receiver side on all PCIe lanes. x8 PCIe traffic, will turn on 8 LEDs.



During normal operation all LEDs should be ON with the exception of D9 and D10, whose role is to indicate loss of signal. If the Host system is off, all LEDs should be off even if the chassis itself is turned on.

EB4-1u-x8-G2 Chassis Slot Power Indicators:

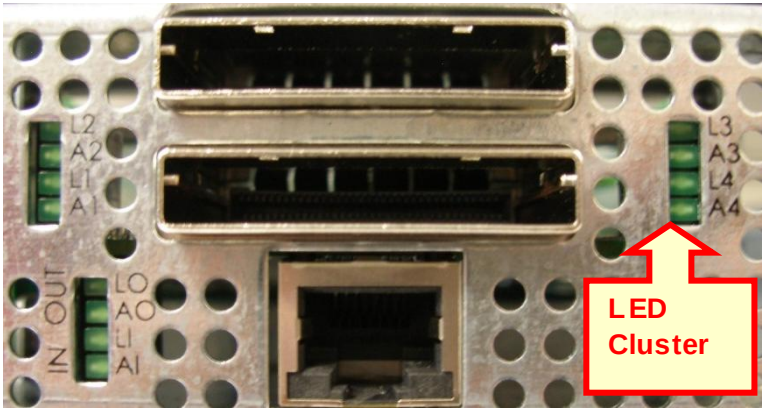
When lit, the red Power Fault LED found on the left side of each expansion slot indicates lack of power at the respective PCIe slot. This would be a normal condition if the chassis is powered on while the Host system is turned off (RESET state) or if power to a specific slot has been removed for it to be swapped as part of the Hot-Plug procedure :

If the Host system is turned ON but there is no PCIe card in the slot, the Power Fault LED will be ON as well, as can be seen below:

In all other cases of normal operation, the respective **green PWR EN LED** should be lit for each slot – whether a PCIe card is inserted or not.

Chassis Linkup and Activity Indicators:

These indicators were purposely made visible through the card carriage when it is closed in order to allow a quick verification of connectivity between Host and chassis.



The three LED clusters display **Link (L)** and **Activity (A)** status for Uplink communication with the Host; Downlink communication with a Daisy- Chained chassis (see Appendix A for Daisy-Chain setups) and communication with the four PCIe expansion slots as follows:

L**O** – Link **Out**: Downlink/Daisy-Chained device is trained and linked

A**O** – Activity **Out**: Activity on the Downlink channel

L**I** – Link **In**: The EB4-1U-X8 is trained to Uplink device/Root Complex

A**I** – Activity **In**: Activity on the Uplink channel

L**2** – Slot **2** is trained and linked

A**2** – Activity on Slot **2**

L**1** – Slot **1** is trained and linked

A**1** – Activity on Slot **1**

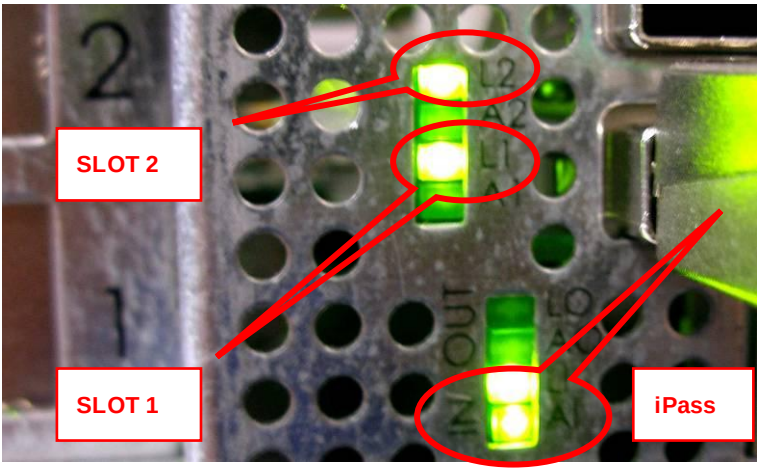
L**3** – Slot **3** is trained and linked

A**3** – Activity on Slot **3**

L**4** – Slot **4** is trained and linked

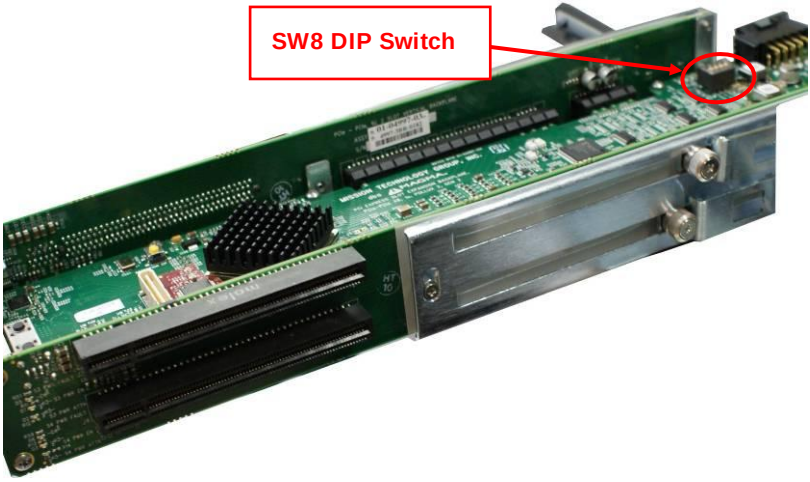
A**4** – Activity on Slot **4**

For example, the scenario pictured below shows a linked and active chassis being connected via the iPass interface to a Host system (LI – Lit; AI—blinking), while the cards in slots 1 and 2 are PCIe-trained and linked but show no activity in terms of transferring data (L1 & L2 – Lit; A1 & A2— Off).

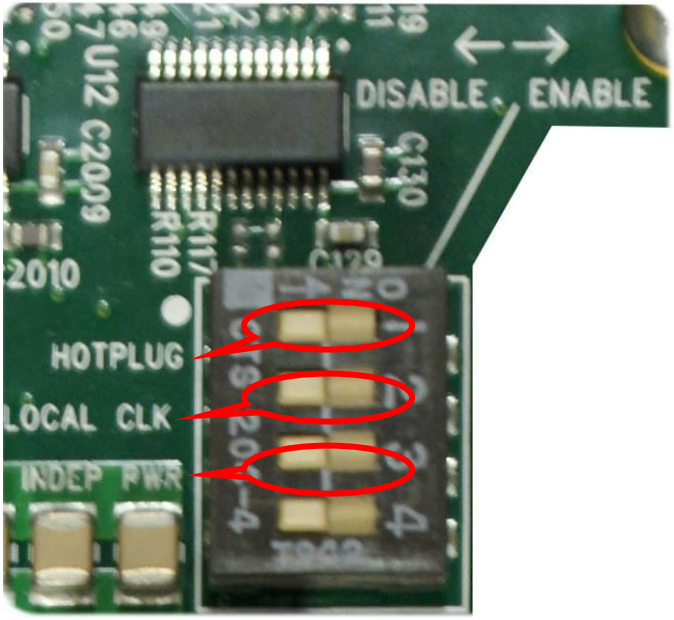


Chassis Alternate Function DIP Switch:

The alternate function DIP switch (SW8) is located on the inner side of the backplane, which requires the card carriage be pulled out to its maximum extension, as shown below:



The Alternate function DIP switch controls the following three functions: Hot Plug, Clock and power delivery behavior.



Actuator (1):

Turns the Hot Plug function ON and OFF. Its default position is ON, i.e. Hot Plug is enabled in which case a Hot Plug controller supervises power delivery to the PCIe slots.

Actuator (2):

Turns on a local clock generated by the chassis itself independent of that of the Host system. Its default position is OFF, i.e. the system Clock comes from the Host system (uplink).

Actuator (3):

Allows to turn on power to the expansion slots without a Host system being connected, by using the SNMP interface via the chassis' RJ-45 Ethernet connector. Its default position is OFF, i.e. no outside agent controls power to the slots.

Actuator (4): Not in use.

SNMP Power-On Source Jumper:

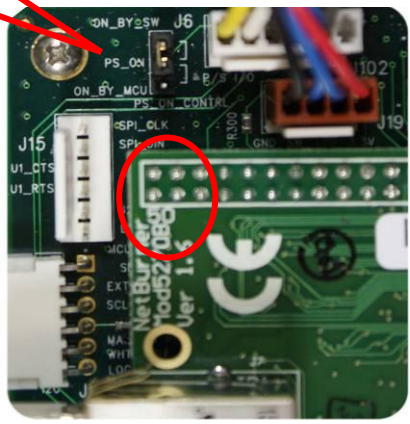
The SNMP module inside the EB4-1U-X8 chassis features a power-on source jumper to select between local power-on (via the master on/off switch) and remote turn-on (via the SNMP software/front end).

In order to gain access to this module (and respective jumper), the top cover of the chassis needs to be removed.
Dismount the chassis from the rack (if applicable) and carefully remove the 11 screws holding the chassis cover in place.

The SNMP module will be located on your left looking at the chassis from the front:

Now locate the J6 jumper as shown below:

- For local power-on set the jumper between **PS_ON and ON_BY_SW** (Default)
- For Remote power-on set the jumper between **PS_ON and ON_BY_MCU**

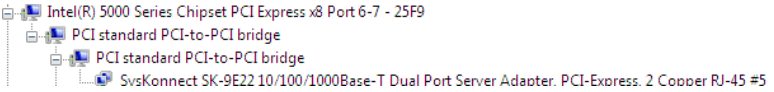


Locating the Problem

If you are having trouble with the Magma expansion system, first verify that all cards and cables are seated properly. Be sure you followed the instructions in earlier sections of this User Guide. Always remember to power **On** and **Off** correctly when rechecking your installation. If you are still having problems, try these troubleshooting steps:

- My Computer Can't Find the PCIe Expansion System
- When Nothing Works
- My PCIe Card Doesn't Work
- My system hangs beyond a certain number of add-in cards

The Magma PCIe Expansion System is correctly displayed as a **"PCI standard PCI-to-PCI bridge"** in Windows Device Manager and as a **"pci-bridge"** in the MAC Apple System Profiler and in Linux. When connected and functioning correctly, this Expansion System will be displayed as follows:


Intel(R) 5000 Series Chipset PCI Express x8 Port 6-7 - 25F9
PCI standard PCI-to-PCI bridge
PCI standard PCI-to-PCI bridge
SysKonnect SK-9E22 10/100/1000Base-T Dual Port Server Adapter, PCI-Express, 2 Copper RJ-45 #5

Windows

pci-bridge	pci	PCI	SLOT-2
pci-bridge	pci	PCI	SLOT-2
pci8086,1107	Ethernet Controller	PCI	9x9

MAC

If this is not what you see when you verify your installation, the following troubleshooting steps may help you locate and resolve your installation issues without having to call Technical Support.

My Computer Can't Find the PCIe Expansion System

If the expansion system is not visible in your Windows Device Manager or your Apple System Profiler at all, you will need to turn off your computer (first) and then the Magma expansion chassis (second) and test all cords and cables to ensure you have everything connected correctly. If everything seems to be connected correctly, and you are sure you have applied power correctly (power up the expansion chassis first and then the computer), then try the following troubleshooting steps:

- Verify that the required LEDs on the back of the chassis are lit as explained in the Chassis Linkup section above. The most important indicators are the LINK LEDs that indicate a proper connection. All LINK LEDs should be ON if both PCIe slots are populated and both an uplink and a downlink iPass cable are connected properly. The ACT (activity) LEDs will light/blink only upon data transfers between host and expansion. They can be off so long as the required LINK LEDs remain on.
- Also verify the Magma PCI Express Host card is properly inserted into the host computer slot. In case any other LED is off, ensure the respective card is functional and properly seated in its ExpressBox slot.
- Try moving the PCIe host card to a different PCIe slot.
- If the expansion system is still not visible after trying all of the above steps, go to Chapter 6 to get additional help.

Windows

If the PCI-to-PCI Bridge is now visible, but contains a (exclamation) in front of it, it has a problem that must be fixed.

To identify this problem, right-click on the line with the and select "Properties" from the pop-up menu.

Resolve the identified problem or go to Chapter 6 to get additional help.

MAC

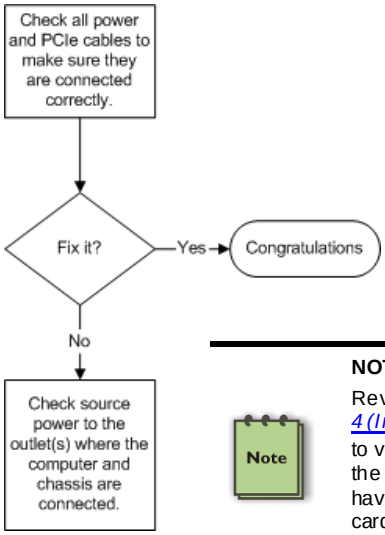
Go to Chapter 6 to get additional help.

RedHat9 Linux

Go to Chapter 6 to get additional help.

When Nothing Works

The following troubleshooting steps will help you when the computer or chassis won't turn on or "nothing seems to work" correctly:


Check all power and PCIe cables to make sure they are connected correctly.
Fix it?
Yes
Congratulations
No
Check source power to the outlet(s) where the computer and chassis are connected.

NOTE

Review Chapters *3 (Verify Installation)* and *4 (Install Cards and Drives)* as necessary to verify that you have a valid installation of the Magma expansion system and that you have correctly installed your 3rd. Party PCIe card(s) and their associated drivers (as required).

If it powers up OK, but nothing works, check the computer's Device Manager or System Profiler to see if the expansion system has been found. If not found, try the troubleshooting steps for My Computer Can't Find the PCIe Expansion System. If the expansion system is visible, but has a problem, try to resolve the problem (See Note above). If that fails, go to Chapter 7 to get additional help.

My Computer Hangs During Power Up

If your computer "hangs" while being turned on and you can't even start, follow the following steps to try to fix this problem:

1. Shut off the computer (first) and then the Magma expansion system and verify that all cards and cables are connected and seated correctly.

2. If it still hangs and you have added one or more hard drives in addition to several PCIe cards, ensure that you have not exceeded the power capabilities of the expansion system's power supply. You can verify the capacity of your power supply by checking the label on the power supply. If you are not certain about the power consumption of your peripherals, it is best to remove them one by one (starting with those you suspect of being most "power hungry") until the system powers up.

3. If you have removed all 3rd. Party PCIe cards from the Magma chassis and it still hangs, try the following:

   a. Remove the Magma PCIe expansion host card from the computer and try booting up without the Magma expansion system attached.

      i. If it boots up OK without the Magma expansion system attached, call Magma Technical Support.

      ii. If it still hangs, the problem is in the computer and not with the Magma expansion system or the 3rd Party PCIe cards.

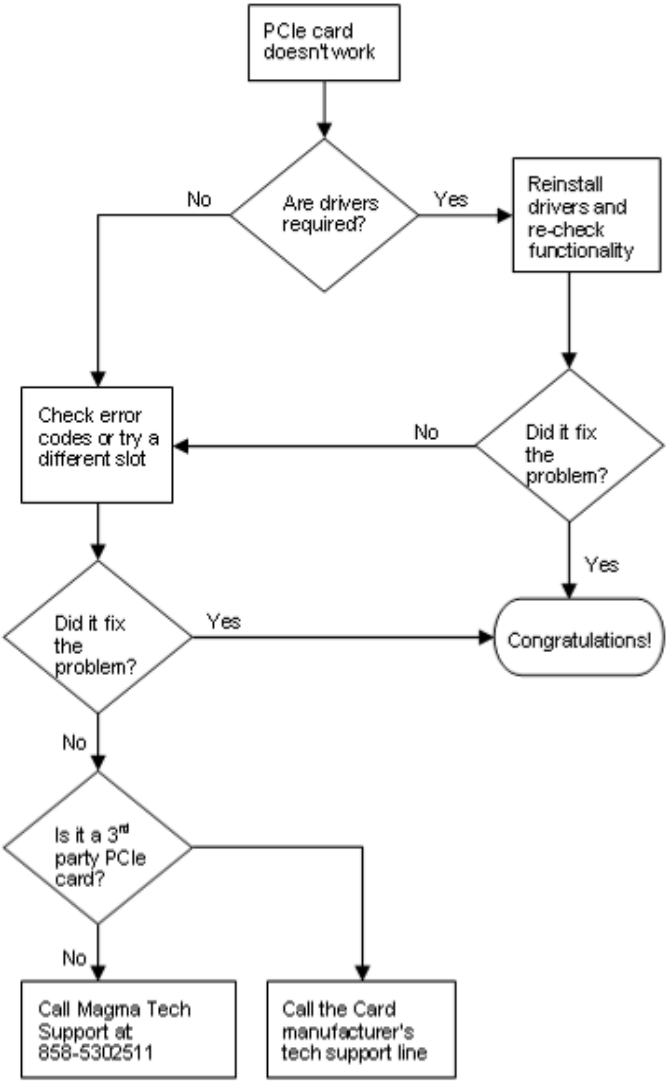
   b. If it boots up OK without any 3rd Party PCIe cards installed, try adding only one card and see if it boots up.

      i. If it boots up OK with one card in it, shut it down and swap cards. Repeat this until all cards have been tested. If they all test OK, then add them back one at a time until you find the combination that doesn't work. If you find a bad card, call Technical Support. If you don't – congratulations, you fixed it!

      ii. If it still hangs up, try a different card – this one is probably bad (or has driver problems). If the second cards works, troubleshoot the first card. If the second card also fails, call Technical Support.

My PCIe Card Doesn't Work

The following flowchart describes a general approach to resolve PCIe card issues:



The following additional steps might also help when the above troubleshooting steps fail to resolve your problem:

1. Shut down the computer followed by the Magma expansion chassis

2. Remove the PCIe card displaying a problem

3. Replace the "problem card" with a *simple* PCIe card, such as an Ethernet card that has drivers built into the operating system. *(Using this "type of card" will avoid any future questions about drivers possibly being installed incorrectly.)*

4. Turn on the Magma expansion chassis, and then turn on the computer.

Windows

5. Next, open the Device Manager (View by Connection selection).

   If the is gone, the problem is with the 3rd Party PCIe card or the card drivers. You should go to the Windows Error Codes section of this chapter to learn how to troubleshoot using error codes.

   If the is still visible, the problem may be with the Magma expansion system. Please contact Magma Technical Support for further guidance and/or a replacement product.

MAC

5. Next, open the Apple System Profiler and the 3rd Party PCIe card(s) should now be visible.

RedHat9 Linux

5. Using the **lspci** command, verify that the PCIe card is visible.

Support for 3rd. Party PCIe Cards

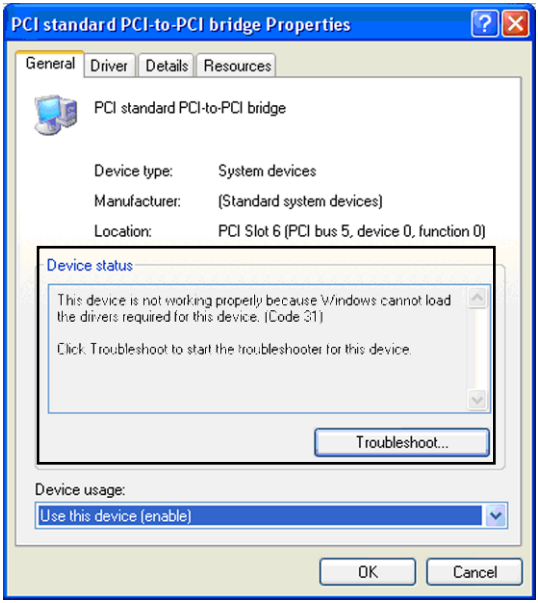
Magma will provide reasonable technical support to with 3rd. Party PCIe cards. However, if you have verified a successful installation of the Magma PCIe Expansion System (as defined in Chapter 4), but experience difficulty installing your 3rd. Party PCIe cards, the card manufacturer should be able to provide the best support.

IMPORTANT

The Magma PCIe Expansion System is designed to function exactly like your desktop computer. This means that you should follow the card maker's instructions for installation on a Windows or Mac computer as if the expansion chassis WAS the desktop computer. When correctly installed, there is no difference to the operating system, removable cards, or most software.

Windows Error Codes

If you are having a problem with one of your devices, and the Device status box shows a Windows Error Code, refer to the following list of error codes for guidance:



Error Code	Description/Action
10	**This code indicates that there is a problem with the 3rd Party PCIe Card driver.** If necessary, contact the card's manufacturer for updated software drivers. If all else fails, contact Magma Technical Support for further assistance.
12	**On the Bridge:** If you receive error code 12 on the first PCI to PCI Bridge, call Magma Technical Support. **On the Card**: This usually means the memory, I/O, or prefetch is more than has been allocated. Call Magma Technical Support.

Error Code	Description/Action
28	The driver for the PCIe card is not installed on your system. Reinstall the card driver following the manufacturer's instructions. If that fails to fix the problem, call the card manufacturer for new drivers.
1	The PCIe host card or expansion chassis are not working correctly. Reinstall the PCIe host card into the computer's slot and recheck all cable connections. If the error code remains, try another PCIe slot. If the error persists, call Magma Technical Support.
Other Codes	For all other error codes, call: **On the PCI to PCI Bridge:** Magma Technical Support **On the Card:** Card Manufacturer's Technical Support, after first verifying that the Magma expansion system is installed properly.

If you are still having problems, contact Magma Technical Support for more help.

My system hangs beyond a certain number of add-in cards

Any PCI or PCI Express expansion scheme requires the cooperation of the computer system's BIOS in order to operate properly, regardless of the platform (PC/Laptop/Server) or operating system (MS Windows/MAC OS/LINUX etc.)

The BIOS hosts the first and the most fundamental code (firmware) that a computer executes upon boot-up. It is then that each and every PCI/PCIe add-in card (be it located on the host system or on Magma's expansions chassis) is allocated Input/Output memory space for proper operation.

By installing multiple add-in cards in one chassis or daisy-chaining multiple Magma chasses (as discussed in: Appendix A), we're requesting more and more resources from the BIOS and thus must make sure we pre-allocate them sufficiently.

It is therefore imperative that our computing platform allocates **at least 32KB** of I/O memory space to allow multiple add in cards to operate properly. This setting may be editable or preset by your BIOS (or computer) vendor. If you're having this problem it is recommended that you first update your system to the latest firmware provided by your vendor. Instruction on how to do that (as well as making a backup of your current BIOS firmware) should be provided by your computer vendor on their web site.

In case this property is editable, you computer vendor should also be able to tell you how to select at least 32KB using their BIOS interface.

Chapter 6 How to Get More Help

Frequently Asked Questions (FAQ)

You can visit the Magma Technical Support FAQ pages on the Internet at:

www.magma.com/support/

Contacting Technical Support

Our support department can be reached by fax at (858) 530-2733 or by phone at (858) 530-2511. Support is available Monday through Friday, 8:00 AM to 5:00 PM PT. When contacting Magma Technical Support, please be sure to include the following information:

1) Name
2) Company Name
3) Phone Number
4) Fax Number
5) Email Address
6) Model Number
7) Serial Number
8) Computer Make
9) Computer Model
10) Operating System and Version
11) Make/Model of PCI cards in expansion chassis
12) Detailed description of the problem

You can also visit our web site at:

www.magma.com/support/

For a quick response, use the Technical Support and RMA Request Form available in the Support Section of the website. Simply complete the form with all required information. Please make sure that your problem description is sufficiently detailed to help us understand your problem.

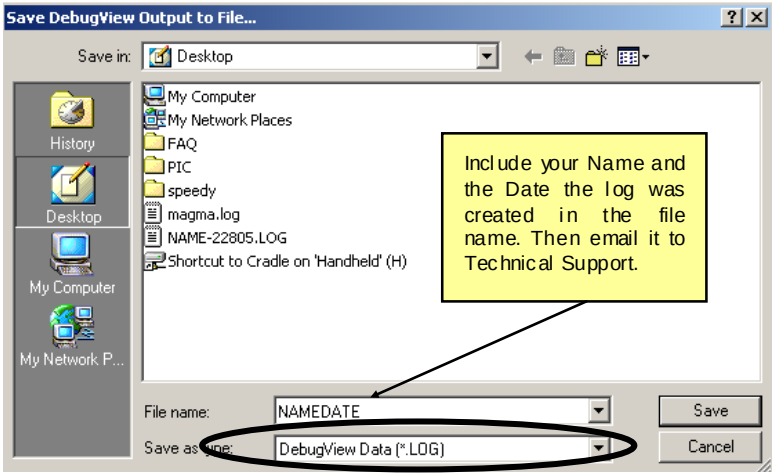
> *For example: Don't say "Won't boot up." Do say "Tried all the steps in the Troubleshooting Section and it still won't boot up."*

For faster diagnosis of your problem, please run the two utility programs described in the following sections and include the diagnostic files they generate with your email.

Magma Debug Utility

Occasionally, Technical Support may request Windows users to produce and email a Magma debug log file to help them resolve your problem. This file should be included as an attachment when submitting a Technical Support request at www.magma.com/support.

1. Locate a file called **dbgview.exe** on the Magma CDROM.
2. Double-click on the file **dbgview.exe**
3. While the **dbgview** screen is open, locate and double-click on a file called **dump.exe** on the Magma CDROM.
4. Switch back to the **dbgview** screen, which is now filled with data.
5. Save the file and include it as an attachment when submitting a Technical Support request.



Use the "Save as type" drop-down arrow to select a file type of (*.LOG).

PCIScope Software Utility

PCIScope is a powerful tool for Windows users. It was designed by a Germany company called APSoft. This software utility is a valuable resource to explore, examine and debug the PCI subsystem of your computer. It was made to fit the requirements of the most demanding users, especially engineers, programmers, and system administrators, and to integrate all advanced functions and tools into one product. Please visit "www.tssc.de" for more information about the capabilities of **PCIScope** and other utilities offered by APSoft.

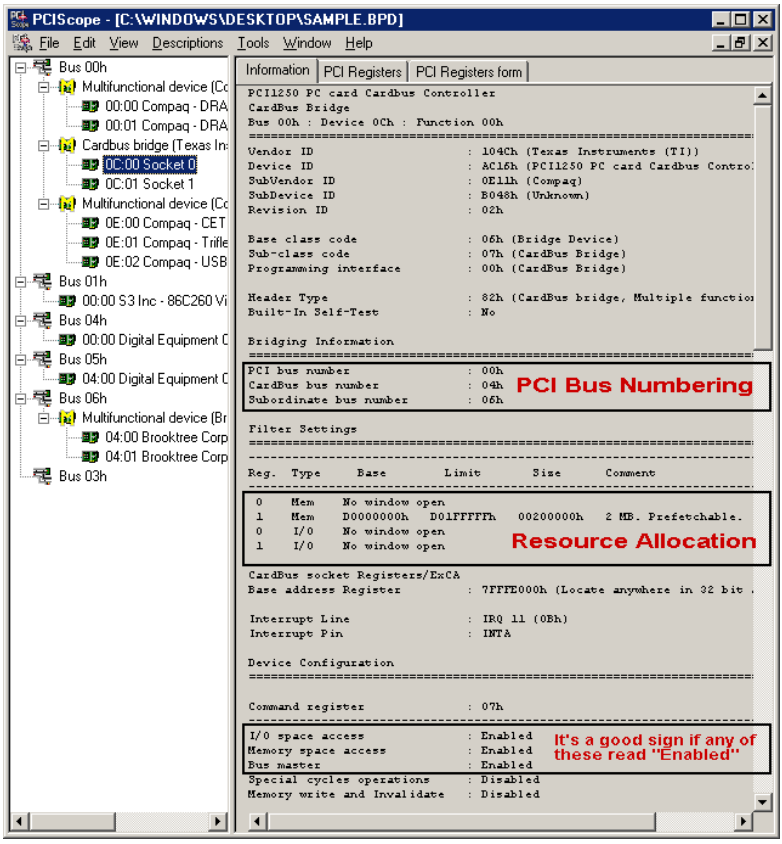
An evaluation version of **PCIScope** is available for download at "www.tssc.de". (You can purchase an inexpensive license from APSoft for use beyond the evaluation period.)

PCIScope has proven to be extremely useful when verifying and debugging configurations involving the Magma PCI Expansion Systems under any Windows platform.

PCIScope can provide information to you and our Technical Support Group such as PCI Bus Numbering, Resource Allocation, and other information that may prove useful when debugging expansion chassis or PCI card problems.

If you are experiencing problems setting up your system, you should run **PCIScope** before contacting the Magma Technical Support Group.

With the Magma expansion chassis powered up and connected to your computer, load and launch the **PCIScope** application. The **PCIScope** Program will be installed on your computer and a window similar to the one shown below will appear. (The example was taken from a Compaq Armada 7400)


PCIScope - [C:\WINDOWS\DESKTOP\SAMPLE.BPD]
File Edit View Descriptions Tools Window Help
Bus 00h
Multifunctional device (Cc
00:00 Compaq - DRA
00:01 Compaq - DRA
Cardbus bridge (Texas In:
0C:00 Socket 0
0C:01 Socket 1
Multifunctional device (Cc
0E:00 Compaq - CET
0E:01 Compaq - Trifle
0E:02 Compaq - USB
Bus 01h
00:00 S3 Inc - 86C260 Vi
Bus 04h
00:00 Digital Equipment C
Bus 05h
04:00 Digital Equipment C
Bus 06h
Multifunctional device (Br
04:00 Brooktree Corp
04:01 Brooktree Corp
Bus 03h
Information
PCI Registers
PCI Registers form
PCI1250 PC card Cardbus Controller
CardBus Bridge
Bus 00h : Device 0Ch : Function 00h
Vendor ID : 104Ch (Texas Instruments (TI))
Device ID : AC16h (PCI1250 PC card Cardbus Contro
SubVendor ID : 0E11h (Compaq)
SubDevice ID : B048h (Unknown)
Revision ID : 02h
Base class code : 06h (Bridge Device)
Sub-class code : 07h (CardBus Bridge)
Programming interface : 00h (CardBus Bridge)
Header Type : 82h (CardBus bridge, Multiple functio
Built-In Self-Test : No
Bridging Information
PCI bus number : 00h
CardBus bus number : 04h
Subordinate bus number : 06h
PCI Bus Numbering
Filter Settings
Reg. Type Base Limit Size Comment
0 Mem No window open
1 Mem D0000000h D01FFFFFh 00200000h 2 MB. Prefetchable.
0 I/O No window open
1 I/O No window open
Resource Allocation
CardBus socket Registers/ExCA
Base address Register : 7FFFE000h (Locate anywhere in 32 bit
Interrupt Line : IRQ 11 (0Bh)
Interrupt Pin : INTA
Device Configuration
Command register : 07h
I/O space access : Enabled
Memory space access : Enabled
Bus master : Enabled
Special cycles operations : Disabled
Memory write and Invalidate : Disabled
It's a good sign if any of these read "Enabled"

You should save this data as a file on your computer. Please include your name and date as part of the file name with an extension of ".bpd." This file should be included as an attachment when submitting a Technical Support request at www.magma.com/support.

Returning Merchandise to MAGMA

If factory service is required, a Service Representative will give you a Return Merchandise Authorization (RMA) number. Put this number and your return address on the shipping label when you return the item(s) for service. **Magma will return any product that is not accompanied by an RMA number**. Please note that Magma WILL NOT accept COD packages, so be sure to return the product freight and duties-paid.

Ship the well-packaged product to the address below:

MAGMA RETURNS DEPT.
RMA # _____
9918 Via Pasar
San Diego, CA 92126
USA

It is not required, though highly recommended, that you keep the packaging from the original shipment of your Magma product. However, if you return a product to Magma for warranty repair/ replacement or take advantage of the 30-day money back guarantee, you will need to package the product in a manner similar to the manner in which it was received from our plant. Magma cannot be responsible for any physical damage to the product or component pieces of the product (such as the host or expansion interfaces for the PCIe expansion chassis) that are damaged due to inadequate packing. Physical damage sustained in such a situation will be repaired at the owner's expense in accordance with Out of Warranty Procedures. Please, protect your investment, a bit more padding in a good box will go a long way to insuring the device is returned to use in the same condition you shipped it in. Please call for an RMA number first.

Appendix A Need More PCIe Slots?

Multiple PCIe Expansion System Configurations

The PCI Express Local Bus Specification defines the bus as *hierarchical*, where logical PCI to PCI Bridges (PPBs) may be used to add "levels" to the PCI bus hierarchy within a PCIe switch. Because hierarchies are *organized systems arranged into different levels*, you can take advantage of this automatic organizing and layering to expand the number of available PCIe slots beyond the number available in your computer's motherboard.

You can easily add two or more Magma expansion systems to your current system in either a "fan-out" or "daisy-chain" configuration. Each of these configurations has advantages and uses. To determine which type of configuration you wish to use, you should first understand a few basic facts:

1. In a desktop computer, the BIOS enumerates automatically behind logical PCI bridges. In the Magma configuration, the BIOS looks beyond the Host card to find any PCIe cards installed in the expansion chassis behind a PCIe switch. The PCIe switch, in turn, emulates logical PRBs. The BIOS can then configure the cards and allocate resources. Empty PCIe slots are ignored during configuration.

In theory, your computer "should" be able to travel across up to 255 PCIe buses to identify and configure all installed PCIe cards. The 255 PCI bus limit is actually a theoretical maximum. The practical limit is somewhat lower and differs from one system to another, but should still be a fairly large number.

In a desktop computer the bus numbers tend to be lower (0, 1, 2, etc.). Once the BIOS is finished configuring everything and assigning resources, the Operating System starts loading and activates the PCIe cards found.

When adding more Expansion Systems to an existing system, be sure to connect and test them "one-at-a-time." This will allow you to quickly resolve any connectivity, or other, issues right at the start. *DO NOT INSTALL any 3rd Party PCIe cards into any system until ALL attached systems are working correctly.*

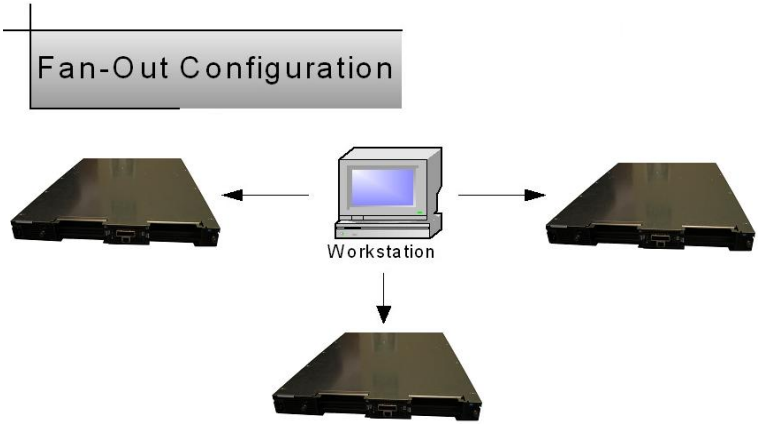
2. Most computers allow multiple logical bridges (and thus PCIe buses) to be correctly configured. Some computers, unfortunately, place an arbitrary limit on the number of bridge levels that can be traveled during power-on configuration. Your computer “power-on-software” should be compliant with the PCIe bus specification 1.1 in order to effectively use a Magma PCIe Expansion System. For "fan-out" and "daisy chained" system configurations, where more than one PCIe expansion system is being used, you should count all of the logical bridge levels to your most deeply nested PCI bus to determine the maximum number of bridge levels that must be traveled. Exceeding this number may cause software configuration conflicts even though hardware-wise the PCIe system is properly configured.

3. For easier understanding, a given PCI system should be viewed as a “Resource Toll road” that runs from the computer CPU (resource home), through the “Toll Booths” (the PCIe switches and logical PCI bridges), to the “Resource Users” (PCIe Cards). As in the case of a real Toll Road, the more Toll Booths you have to cross (even if it takes a nanosecond), the longer it will take you (your data) to get from the PCIe Card to the CPU and back again. Under most circumstances the effect cannot even be detected. However, under other conditions, it can be important to know about.

Fan-Out

For reasons described in bullet #3 above, we recommend using a fan-out configuration when you need to add successive PCIe expansion systems to the host computer. This addition to the PCI bus hierarchy is at the "peer" level of other existing expansion buses, thus adding "breadth" to the PCI bus hierarchy, since these buses will be at the same hierarchical level within the system configuration.

You must ensure that you have the corresponding PCIe to PCIe Expansion System, or chassis to connect with your host card to support your desired configuration.

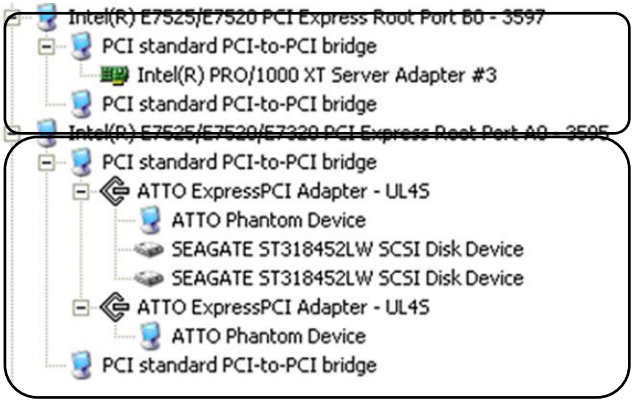


In this configuration, you have fewer “Toll Booths” to pass through; therefore the latency is shorter, however you’ve “sacrificed” another PCIe slot from the host computer, which may not always be an option.

For clarification, it is necessary to understand that the amount of latency caused by a PCIe switch (or a PCIe-to-PCI bridge built into some 3rd Party PCIe cards) is negligible (“nanoseconds”) and will not produce any visible effect on most systems. It is only mentioned here because of certain specialized configurations involving unique PCIe cards with special software drivers. The total number of logical buses that the data must pass through COULD make a difference. See Chapter 5 Troubleshooting for more information if you suspect this could be an issue with one of your specialty PCIe cards.

Verify your configuration

Before you start installing your PCIe cards (refer to Chapter 4 Install Cards and Drives for more information), you should confirm that everything is in proper working order. Refer to Chapter 3 Verify Installation for guidance in verifying the proper installation of your Expansion System. For example, the following image shows the division within the Windows Device Manager display between two Expansion Systems connected in a "Fan-Out" configuration. In this case each expansion chassis offers only two slots of expansion.


Intel(R) E7525/E7520 PCI Express Root Port B0 - 3597
PCI standard PCI-to-PCI bridge
Intel(R) PRO/1000 XT Server Adapter #3
PCI standard PCI-to-PCI bridge
Intel(R) E7525/E7520/E7320 PCI Express Root Port A0 - 3595
PCI standard PCI-to-PCI bridge
ATTO ExpressPCI Adapter - UL4S
ATTO Phantom Device
SEAGATE ST318452LW SCSI Disk Device
SEAGATE ST318452LW SCSI Disk Device
ATTO ExpressPCI Adapter - UL4S
ATTO Phantom Device
PCI standard PCI-to-PCI bridge

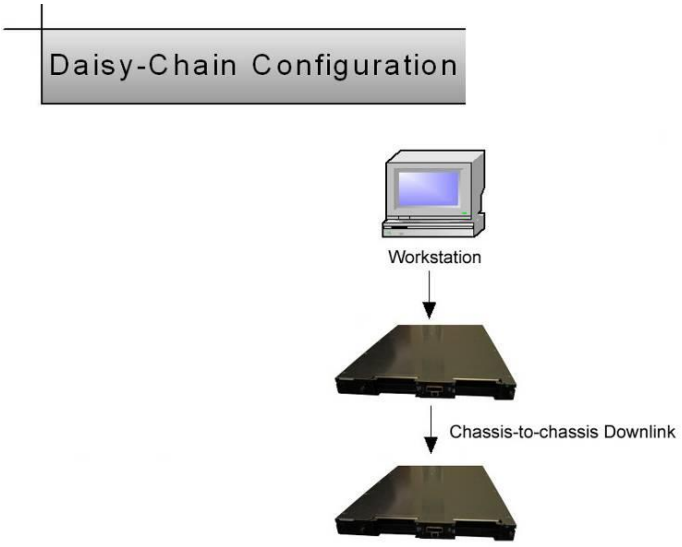
The following image shows the Apple Profiler display when a MAC has 2 Expansion Systems connected in a "Fan-Out" configuration

Card	Type	Bus	Slot
ATTO ExpressPCI UL4S	scsi-2	PCI	ex9
ATTO ExpressPCI UL4S	scsi-2	PCI	ex9
ATY,RADEON	display	PCI	bx9
bcom5714	network	PCI	GIGE
bcom5714	network	PCI	GIGE
GeForce 6600	display	PCI	SLOT-1
pci-bridge	pci	PCI	SLOT-4
pci-bridge	pci	PCI	SLOT-3
pci-bridge	pci	PCI	SLOT-3
pci-bridge	pci	PCI	SLOT-2
pci-bridge	pci	PCI	SLOT-2
pci-bridge	pci	PCI	SLOT-4
pci8086,1001	Ethernet Controller	PCI	7x9

Daisy-Chaining

Recognizing the typical insignificance of the performance variance between the "Fan-Out" and "Daisy-Chaining" configurations, the primary reason for using this one would be limitations on physical space. This

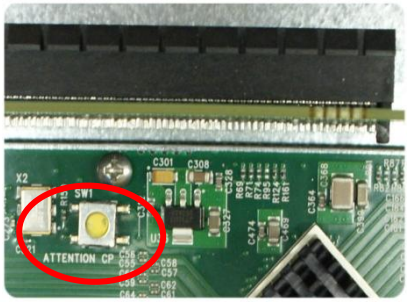
could be the number of available slots on the host computer motherboard, or a lack of desk or rack space.



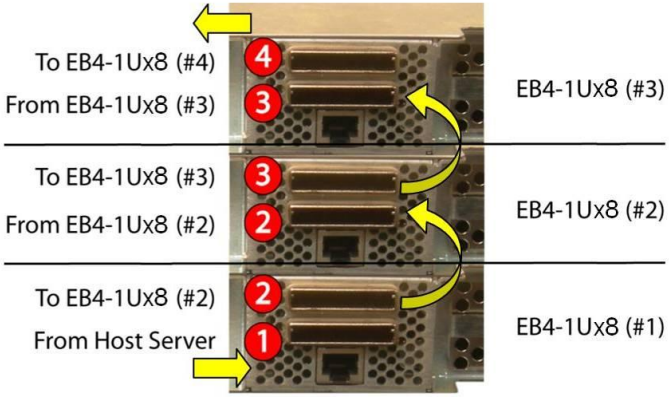
In the daisy-chain configuration, successive PCIe expansion systems are added to the "end" of the PCIe expansion hierarchy, which adds "depth" to the Local Bus by increasing the number of the logical PCI levels active in the system configuration.

The daisy-chain configuration is therefore more popular among the users that have only one available PCIe slot on the host computer, but require 8, 12 or more PCIe slots keeping in mind that more latency will be introduced every time we go past one expansion chassis to the other.

Note: A downlink daisy-chained chassis can be Hot-unplugged without having to turn-off the chassis it is connected to. That can be accomplished by pressing the "Attention CP" pushbutton shown below:



In practice, the daisy chain configuration will be connected as follows:



Verify your configuration

Before you start installing your PCI cards (refer to Chapter 4 Install Cards and Drives for more information), you should confirm that everything is in proper working order. Refer to Chapter 3 Verify Installation for guidance in verifying the proper installation of your Expansion System.

NOTE

Notice that each Daisy-Chained unit appears in the Device Manager in the reverse order of its place in the configuration.

PCIe Card Conflicts

If you determine that one PCIe card is interfering with the operation of another card, first try reorganizing the cards on the motherboard. Moving the cards around can change the order in which the cards are configured by the system during power-on. This will go a long way toward resolving module conflicts.

Power-On Sequence for Advanced Configurations

As previously stated in Chapter 2 Hardware Installation, it remains necessary to power up ALL Expansions Systems BEFORE you turn on the computer. This will ensure that your power-on software can read all available buses and properly configure all installed PCIe cards.

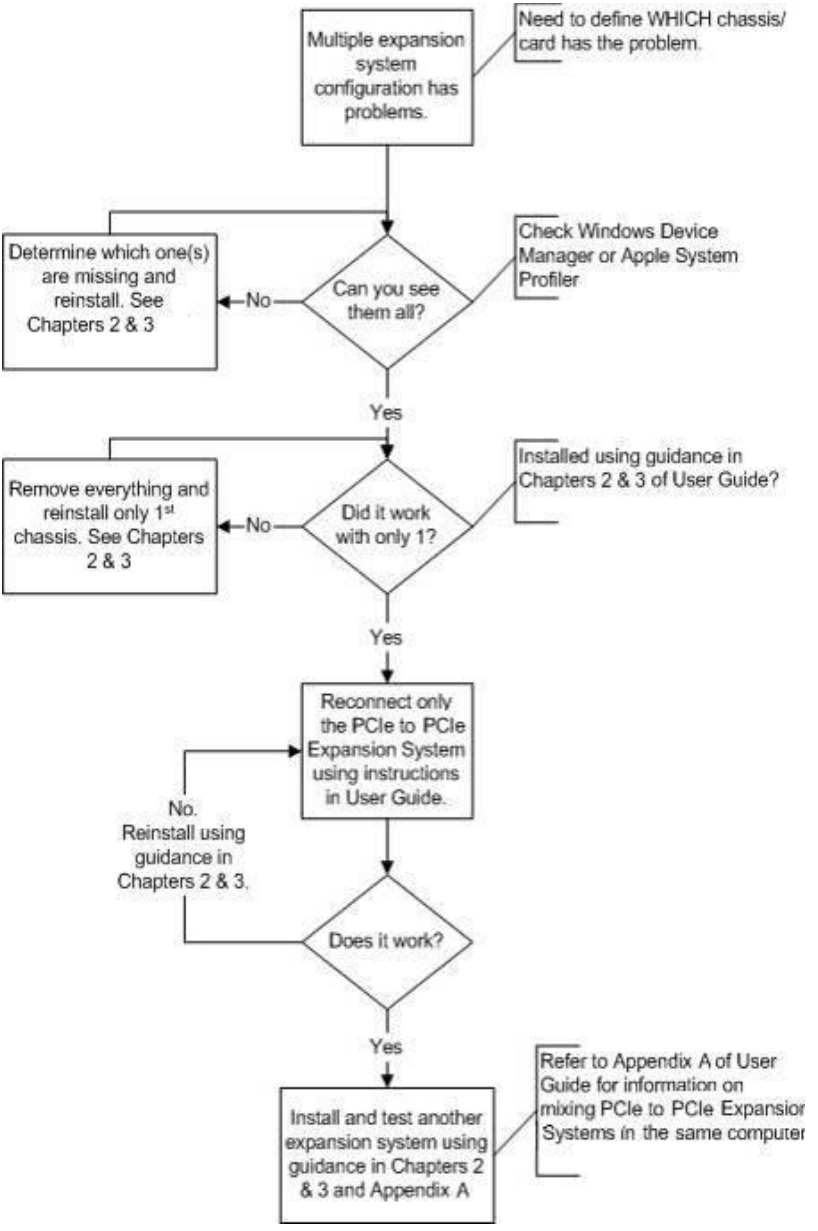
Obviously, the reverse also remains true for shutting your system down. The computer must be shut off BEFORE you attempt to turn off your Expansion System(s).

Troubleshooting Advanced Configurations

When trying to troubleshoot problems with PCIe cards in a multiple expansion system configurations, it is vital to correctly determine the nature of the problem. Therefore, the first task is to identify the card or chassis having a problem by using the Windows Device Manager, or Apple System Profiler. Refer to the first part of this Appendix for more information on identifying hierarchical levels in multiple expansion system configurations.

Problems with 3rd Party PCIe cards might only be traceable once you have identified the expansion system containing the problem card.

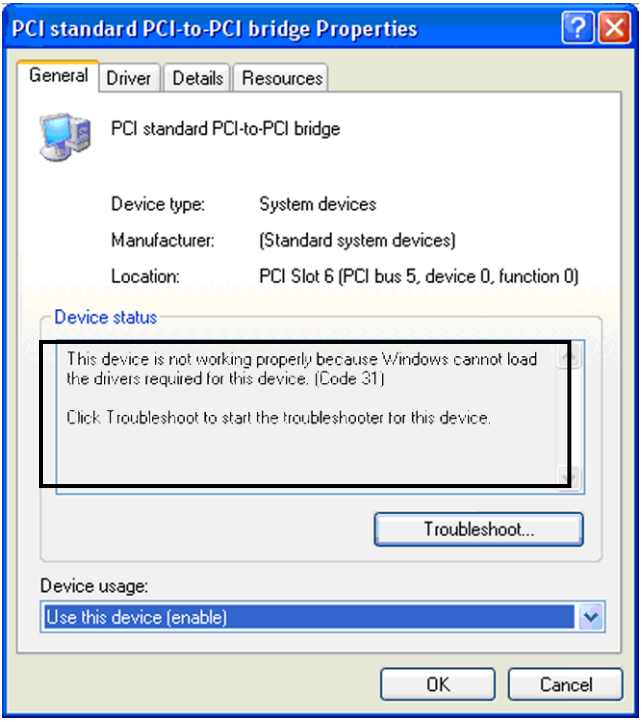
Below is a flow chart offering a troubleshooting approach when multiple expansion chasses are involved:


Multiple expansion system configuration has problems.
Need to define WHICH chassis/ card has the problem.
Can you see them all?
Check Windows Device Manager or Apple System Profiler
No
Determine which one(s) are missing and reinstall. See Chapters 2 & 3
Yes
Did it work with only 1?
Installed using guidance in Chapters 2 & 3 of User Guide?
No
Remove everything and reinstall only 1st chassis. See Chapters 2 & 3
Yes
Reconnect only the PCIe to PCIe Expansion System using instructions in User Guide.
No. Reinstall using guidance in Chapters 2 & 3.
Does it work?
Yes
Install and test another expansion system using guidance in Chapters 2 & 3 and Appendix A
Refer to Appendix A of User Guide for information on mixing PCIe to PCIe Expansion Systems in the same computer

Finding the Problem Card

Windows

If you need help to determine which PCIe card, or which expansion chassis, has the problem, you can “right-click” on the card with the and check the information contained in the “Location:” field.



Look for the “Error Code” in the box in the center of the Properties Window and then go to the Windows Error Code section for information on how to resolve this issue.

MAC and Linux

If you have already reinstalled and reseated everything according to instructions in Chapter 2, and the PCI to PCI Bridge is still not visible in the Apple System Profiler, call Magma Technical Support.

APPENDIX B Compliance

FCC

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE

The assembler of a personal computer system may be required to test the system and/or make necessary modifications if a system is found to cause harmful interferences or to be noncompliant with the appropriate standards for its intended use.

Industry Canada

This Class A digital apparatus complies with Canadian ICES-003. Cet appareil numériqué de la classe A est conformé à la norme NMB-003 du Canada

CE

CE

The product(s) described in this manual complies with all applicable European Union (CE) directives. Magma will not retest or recertify systems or components that have been reconfigured by customers.

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Manual P/N 09-09949-01-B